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# PERSONAL COMPUTER WORLD

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February 1999  
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**PCs**  
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Bargains

# £499

**FIRST UK  
REVIEW**



## HP Jornada

Windows CE grows up

## Printers

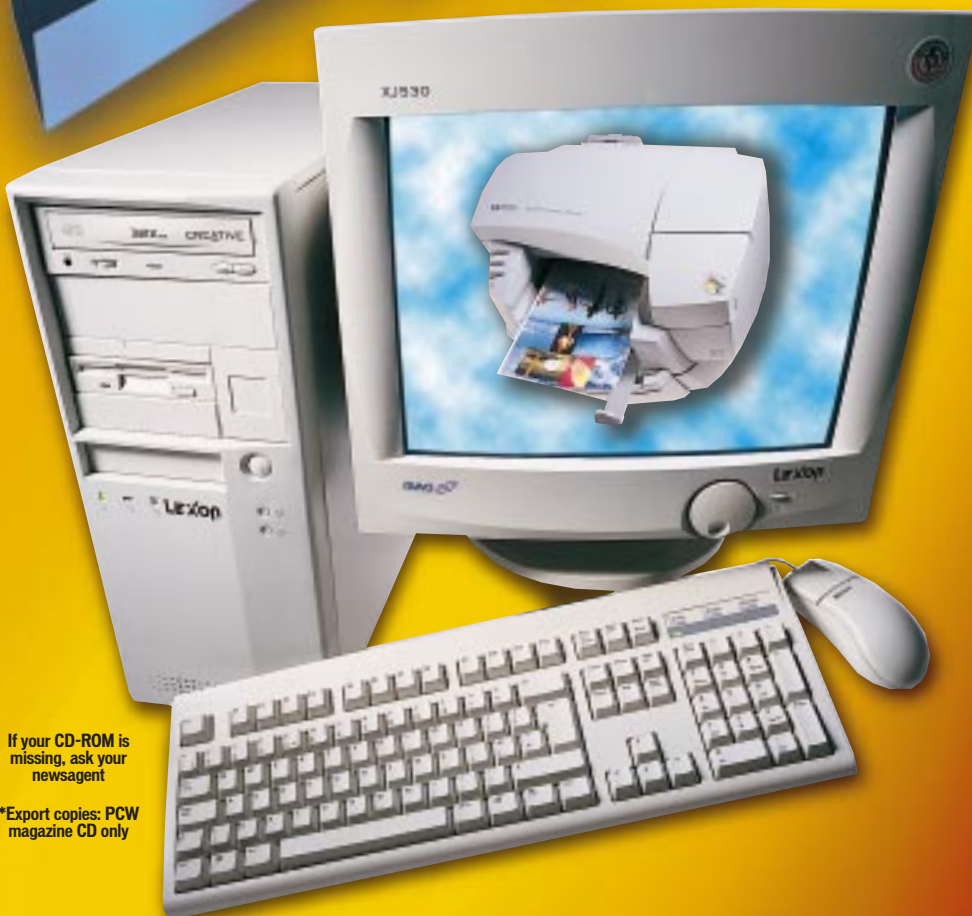
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## Colour inkjets

8 brand new models

## Which ISP?

Read before you sign up



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See inside for details

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ON  
CD**



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Windows CE in a **sub-notebook** is probably all you need, on the road.

## CE, it makes sense

**A PC for £499 (ex VAT)?** After the heady and often expensive celebrations of the season, we thought we'd see what kind of system you could get at this rock-bottom price. The ten entry-level PCs we tested in our labs may be no match for a state-of-the-art system costing nearer £2,000, but if you want to run standard office applications, send email and get on the net, they're more than adequate. In fact, you'll be surprised at how good they actually were. Turn to our group test on page 162 to find out more.

Decent PCs at reasonable prices are good news for everyone, but the product I'm most excited about is Hewlett-Packard's Jornada. From the outside it may look like one of the new breed of super-slim sub-notebooks, yet rather than squeeze a PC inside, HP has instead opted to run the latest version of Windows CE, the operating system normally found on handheld, pocket-sized portables.

**When you think about it, CE makes total sense** on any portable computer. Running from an efficient ROM, it starts almost instantly and requires neither a power-hungry hard disk nor expensive components to manage its day-to-day operations. High performance and long battery life from a portable

with a low price tag? Sounds almost too good to be true. You see, until now you've only been able to buy this apparently ideal configuration in pocket-sized handhelds — nice, but hardly business workhorses. As many manufacturers attempt to

When you think about it, **CE MAKES TOTAL SENSE** on any portable computer. It starts almost instantly and the batteries last for ages

produce ever smaller fully-functional portable PCs, HP has taken the CE advantage and popped it into a sub-notebook form factor, complete with a decent-sized colour screen and quite usable keyboard. You may argue that CE has a limited range of applications, but there aren't many people who use more than the basic office and email packages on the move.

So what should you buy if you're in the market for a colour portable at around the £1,000 mark? Are you tempted by the fruits of CE, or would you be ultimately happier with what is basically a portable version of what's on your desk? It's a tricky one, so along with a full review of the Jornada in this issue, it also stars in a brand new PCW section: Head to Head, where we compare two products which do essentially the same job but in quite different ways. This month it's the Jornada *vs* the Acer TravelMate (a slim Windows notebook), rating the pros and cons of using CE Professional or Windows 98 on a portable. Please contact us if you have any candidates you'd like to see go head to head in future issues.

**Also in this issue** are group tests of laser printers and colour inkjets, a round-up of remarkably cheap and easy-to-set-up kits for building small networks, and an in-depth guide to choosing an ISP, as well as the latest news and reports from the industry's biggest show, Comdex Las Vegas. If your New Year's resolution was to start your own business or get clued up on the world of IT and PCs, here's where to start — and all the best for 1999.

Gordon Laing, Editor

WELCOME TO THE **FEBRUARY 1999** PERSONAL COMPUTER WORLD CD-ROM

# February COVER DISC

GAMES

APPLICATIONS

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ENTERTAINMENT

INTERNET

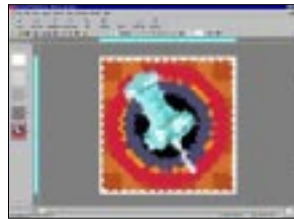
**Make sweet music** with our great combined package of music software including full versions of Cakewalk Express 3.02 MIDI sequencer and the funky Roland MIDI karaoke player. If you fancy moving up to any of the latest versions of Cakewalk, we've got the demos for you to try and some of the most spectacular upgrade deals around — only through this month's *PCW*.

**Microsoft shows off** its new combined drawing and painting package, PhotoDraw, and offers you the chance to win a drawing tablet by entering its online competition.

**For online gamers** we've got Wireplay's client software and ancient mythological action in Magic & Mayhem.

## Microsoft PhotoDraw

PhotoDraw is a unique photo-editing and illustration package. Especially designed for business users, it reduces the number of steps required to complete any graphics task. It is possible to easily create customised graphics by assembling, manipulating and customising clipart, shapes, scanned and digital photos, text and



### ● Online Competition

You could win a copy of Office 2000 Premium Edition and a Wacom INTUOS graphics tablet worth over £1,000 by entering the online competition at: [www.microsoft.com/uk/office/photodraw/competition.htm](http://www.microsoft.com/uk/office/photodraw/competition.htm).

As well as the main prize, there are also three runner-up prizes of PhotoDraw 2000 worth £99 (ex VAT) each. You can access the site directly from the *PCW* CD via the internet section: click on the flashing bar at the top of the main screen to fire up your browser and at the *PCW* page go to CDLinks to find Photodraw 2000.

**To enter the competition**, simply download one of the pictures supplied at the web site and use the PhotoDraw 2000 editing tools to make it your own individual creation. Then mail your best picture/image into the competition.

### PCW DETAILS

**Platform** Win95/98 or NT 4.0 Service Pack 3 or later

**Limitations** 30-day evaluation

**Sales Contact** All good software retail outlets or [www.microsoft.com/isapi/referral/default.asp](http://www.microsoft.com/isapi/referral/default.asp)

**Tech Support** <http://support.microsoft.com>

No telephone support is available on this product.

images from other graphics programs as well as user-drawn illustrations. PhotoDraw also integrates closely with other Microsoft Office applications such as PowerPoint, Word, Publisher, and also the web.

## Technical information to help you use the CD

### ✓ System Requirements

You will need a PC running Windows 3.1 or 95. The disc will run under NT but functionality may be reduced. Please check individual products for specific system requirements. For best results, run the CD on a Pentium PC with at least 16Mb of memory.

### ✓ How to use the CD-ROM

Put the disc into your CD drive. Windows 95 — The

*PCW* interactive loader will appear on your screen. If your CD doesn't autoloading, go to Start/Run and type <CD Drive>:\pcw.exe Windows 3.1 — From Windows Program Manager choose File/Run, then type <CD Drive>:\pcw.exe and press enter.

### ✓ Faulty Discs

If you get messages like "Cannot read from drive D:," or your drive continually scans the disc without

starting, you may have a faulty disc. In this event, please return the disc with a covering note bearing your name and address, and clearly marked "PCW CD FEBRUARY 1999" to: TIB plc, HelpLine Returns, Unit 5, Triangle Business Park, Pentrebach, Merthyr Tydfil, CF48 4YB. A replacement disc will be sent to you by post. You must use this address as replacement discs cannot be supplied from the VNU offices.

### ✓ Technical Support

If you have technical problems with individual products, check in the magazine or on the CD, for the manufacturer's support contact details. For general problems with the CD, the Technical Helpline is open weekdays (10:30am-12:30pm and 1.30pm-4:30pm) on 01685 354726. A live technical info page is also available through CD Online, direct from the CD (see p19). And see

### IMPORTANT NOTICE

The publisher, VNU, has checked the Personal Computer World CD-ROM for known viruses at all stages of production but cannot accept liability for damage caused either to your data or to your computer system which may occur while using either the disc or any software contained on it. It is good practice to run a virus checker on any new software before running it on your computer and to also make regular backup copies of all your important data. Unless otherwise stated, all software contained on the CD is for demonstration only. This means it may be restricted in some way. For example, it may be time limited or have certain functions disabled.

"Faulty Discs" (above) for replacement disc information.

### ✓ Getting software onto the CD

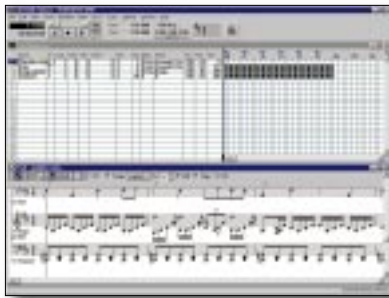
*PCW* is keen to promote quality software and would

like to hear from you if you are interested in having your product included on a future cover disc. Phone Afshan Nasim on 0171 316 9592 or email [afshan\\_nasim@vnu.co.uk](mailto:afshan_nasim@vnu.co.uk).

## Cakewalk Express — Full version

## Roland GS Karaoke Player — Full version

**Cakewalk Express 3.02** is part of the award-winning family of software products for recording, editing and playing music on the PC. It is used at home and in commercial studios worldwide. With Cakewalk, you don't have to be an accomplished musician to



create your own music because playing and recording music is as simple as clicking your mouse or typing with computer keys. Cakewalk Express allows you to manipulate MIDI music data much as you would use a word processor, moving and tweaking

### PCW DETAILS

**Cakewalk Express 3.02**  
**Platform** Windows 3.1 and above  
**Limitations** Full version  
**Sales Contact** Tel +44 (0)1706 228039  
 Fax +44 (0)1706 222989  
**Tech Support** Tel: +44 (0)1706 228039

individual notes and copying and pasting repeated phrases. Different editing views, including track/measure, staff, piano roll and event list allow

you to quickly produce your own multi-track compositions "layer by layer". There is also the "Virtual Piano" which you play by using your mouse or computer keyboard. It works with any Windows sound card so you can play and record with Cakewalk right away, even if you don't have a MIDI keyboard. Another feature of Cakewalk Express 3.02 is the facility to add lyrics to recorded song files. These can be printed out on a score just like proper sheet music. Additionally, any files that you create with lyrics can be used for professional-looking, full-screen, karaoke by importing them into the *full version* of Roland's GS Karaoke Player, which you will also find on this month's cover disc.

**Roland's GS Karaoke Player** is a jukebox-style Standard MIDI File player which plays back music using a quality built-in software synthesiser, simultaneously displaying full-screen images with super-imposed lyrics. You can request the songs you want for consecutive playback or create a list of your favourites as a collection. Or, you can create your own songs using Cakewalk Express 3.02 and add your own lyrics for display in the Karaoke Player, then play them back and see them highlighted in time with the music. By adding your own images to the Karaoke



application's folder, your lyrics can be displayed over pictures of your favourite pop star, auntie or boyfriend/girlfriend! Also included is the Roland GS Software Synthesizer (built-in type), which plays sounds by making your computer's CPU act as a MIDI sound generator. The synthesiser is compatible with the General MIDI System and the GS format (developed by Roland). Music files which comply to the General MIDI System/GS Format can be played using the Karaoke Player. The synthesiser's specifications

### PCW DETAILS

**Roland's GS Karaoke Player**  
**Platform** Windows 95 and 98  
**Limitations** Full Version  
**Sales Contact** Tel +44 (0)181 956 2224  
 Fax +44 (0)181 956 2225  
**Tech Support** None available

include: capacity for up to 16 parts, 128-note polyphony (subject to your computer's specifications), 226 sounds, nine drum sets, reverb and chorus.

## Cakewalk Demos and Upgrade Offers

On the CD, you will also find demonstration versions of the latest editions of Cakewalk software. These have been included to demonstrate the great Cakewalk upgrade and purchase offers (see right) which are available on this month's *Personal Computer World* cover disc. Simply contact Et Cetera Distribution or produce the voucher at any Cakewalk retailer to take advantage of the deal.

- The Cakewalk Home Studio includes

support for up to four tracks of digital audio alongside MIDI.

- Cakewalk Professional supports up to eight tracks of digital audio. there is a real-time mixing console as well as rock-solid synchronisation to film and video.
- Cakewalk Pro Audio 8 is the newest version of the industry's leading MIDI and digital audio software offering up to 128 tracks of audio-plus MIDI, with up to 256 real-time effects and 24-bit audio up to a 96KHz sampling rate.

### CAKEWALK UPGRADE OFFER COUPON

Take this coupon to your favourite music stockist, or order direct from Et Cetera Distribution on 01706 228039. Offer ends 30th April, 1999. (All prices include VAT and shipping.)

- Upgrade to Cakewalk Express v6 for £39. **Save £10**
- Purchase Cakewalk Professional v7 for £99. **Save £100**
- Purchase Cakewalk Pro Audio v8 for £179. **Save £100**
- Purchase Cakewalk Pro Audio Deluxe v8 for £199. **Save £140**

Please note: This offer is made by "Et Cetera", the distributors of Cakewalk software, directly to the readers of *Personal Computer World*. The agreement is solely between "Et Cetera" and the holder of this voucher. Queries should be referred to the "Et Cetera" Sales Department.



## Wireplay



Wireplay is the fast, cool, competitive multi-player gaming service that enables you to experience all the excitement of multiplayer gaming from your own PC. Gaming takes on a new dimension as you battle against friends and other users for the ultimate multi-player

challenge. With a high-speed dedicated network and blistering multiplayer performance, Wireplay is the UK's ultimate dial-up gaming experience. Wireplay is run by gamers and offers the best support for over 90 of the best and latest multiplayer games. These include Total Annihilation, Red Alert, and Age of Empires. On our CD you will find a package which includes the client software required to get connected to Wireplay and a selection of traditional games to get you started. Wireplay Backgammon variations include Classic and Domino and support single-player off-line mode as

well as two players, plus up to four spectators on-line. Bridge supports three main game variants with Matchpoint and Butler scoring. Chess lets you challenge your friends to a match online and scenarios include Friendly, Serious and Fischer Clock. Wireplay's subscription billing option offers unlimited access for a monthly Visa or Mastercard payment of £9.95. If you have a BT phone line you'll be charged for time online at the local rate, which can be as low as 1p per minute.



### PCW DETAILS

**Platform** Windows 95  
**Limitations** Full-version client software and three demo games  
**Sales Contact**  
[www.wireplay.com](http://www.wireplay.com)  
**Technical Support**  
 Tel 0845 577577  
 (12pm - 12am)  
[support@wireplay.com](mailto:support@wireplay.com)

## Magic & Mayhem

From Mythos, the developer of the XCOM series, Magic & Mayhem takes real-time strategy beyond human limits. You are omnipotent and nature is your ultimate weapon. Never before has a commander wielded such power — enough to send a plague upon the enemy, or bring the dead back to life, or make volcanoes erupt. Use magic to command the forces of nature. Lead your army of mythological beasts. Use strategic thinking to defeat your foes. Combine all these elements and you will become a legend in battle. You'll revel in the realism as you watch buildings and forests burn. Creatures



### PCW DETAILS

**Platform** Windows 95 or 98  
**Limitations** Two-level demo and battle mode  
**Sales Contact** Tel +44 (0)171 368 2255  
[www.vie.co.uk](http://www.vie.co.uk)  
**Tech Support**  
 Not available with this demo

can hide in ambush or gain advantage from using the high ground. You must conquer 36 regions. In Celtic, Greek and

Medieval realms housing increasingly dangerous opponents and challenges, the enemy can adapt and no two campaigns will ever be the same. You

can dominate the internet by fighting it out with up to four players online. This is one of the most enjoyable action strategy game to hit the Internet.



# Software Library

Unless otherwise stated, new versions of featured software are not upgrades but standalone installations. If you wish to install the latest version of a product onto your machine, please ensure that you first uninstall or remove the older version.

## Essential Utilities

### • Add/Remove 4Good 2.0

(Windows 95)  
Get rid of those unwanted entries in Control Panel (Limited use shareware).

### • Adobe Acrobat Reader 3.01 + Search

(Win3.1/95/NT)  
Fully-functioning reader.

### • Awave 4.9

(Windows 95/98/NT)  
Read, write and play any sound file format. (30-day shareware).

### • Catch-UP 1.2

(Windows 95/NT or 3.1 with Win32s)  
Search the web for the latest versions of popular internet-distributed programs. (Freeware).

### • GIF Construction Set 1.0Q

(Windows 3.1/95)  
Quick, transparent, interlaced and animated GIF files for web pages. (30-day shareware).

### • DirectX 6

(Windows 95)  
Essential video and audio. (Fully-functioning drivers).

### • Ed for Windows 3.80

(Win3.1/95/NT)  
Language-sensitive

text editing. (45-day trial).

### • EzDesk for Windows 1.8

(Windows 95/NT)  
Manage your desktop icons' layout.

### • Fontastic 5.0

(Windows 95)  
Powerful font management tool. (31-day evaluation).

### • GetRight 3.2

(Windows 95/NT)  
Error recovery and scheduled downloads from web and FTP sites. (30-day evaluation).

### • Go!Zilla 3.1

(Windows 95/NT)  
Recovery and file manager which gets files from the most responsive sites. (Freeware).

### • Graphics Workshop Professional 2.0a

(Windows 95/NT)  
View, convert and catalogue your images in a variety of formats. (Shareware).

### • Macro Express 1.0k

(Windows 95/NT)  
Macro utility allowing you to create macros manually or by recording them. (30-day trial).

### • MacSEE

(Win3.1/95/NT)  
Simple and fast transfer of files between a Mac and a PC. (Limited demo).

### • Microangelo 98

(Windows 95)  
Edit icons from 8 x 8 to 64 x 64 pixels, up to 256 colours. (30-day shareware).

### • Microsoft Excel & Word Viewers

(Windows 95/NT)  
Share files from any

version of Microsoft Word or Excel. (Freeware).

### • MIRC 5.41

(Windows 3.1/95)  
Friendly interface for use with the Internet Relay Chat network. (30-day shareware).

### • Neotrace 1.22

(Windows 95/NT)  
Trace the connections between computers on the internet. (Shareware).

### • Netscape Communicator 4.5 — Standard Edition

(Windows 95)  
Latest version of the internet suite, including Netscape Navigator. (Free version).

### • Norton AntiVirus 5

(Windows 95/NT)  
The latest trial version of Symantec's Complete Virus Protection Suite. (30-day trial).

### • Paint Shop Pro 5.0

(Windows 95)  
The latest version of the popular graphics editor, with features like layer support, Picture Tube brushes, and pressure-sensitive tablet support. (30-day evaluation).

### • SpellWrite for Windows 1.6/2.1

(Windows 3.1/95)  
Spell-check any Windows program, instantly. (30-day shareware).

### • Spinner Plus 1.0.13

(Windows 95/NT).  
Access to over 100 channels of continuous music. (Freeware).

### • UBE 98 1.8

(Windows 98)  
Encrypt self-extracting .exe

files for distribution to others. (Shareware).

### • VuePrint Pro 6.0f

(Windows 3.1/95)  
Widely-used Windows program for viewing images. (15-day evaluation).

### • Web Leech 2.3

(Windows 95/NT)  
Download files which are attached to web pages without having to click individually on each link or file in order to save them. (Freeware).

### • Winarj 95/98

(Windows 95/98)  
A 32-bit Windows Shell for ARJ Archive Software. (Time-limited demo).

### • WinZip 7.0

(Windows 95/NT)  
Industry-standard compression/decompression utility for Windows 95 and NT. (21-day evaluation).

## New Software This Month

### • DesignCAD Pro 2000

(Windows 95)  
A comprehensive computer-aided design package that incorporates a full range of 2D and 3D drawing functions.

Use DesignCAD to create drawings for any assignment, from the simple to the complex. The finished drawing can then be sent to the printer. (30-day trial).

### • ESP 6.4G

(Windows 3.1/95/98)  
A complete contact management system. Maintain lists of business contacts, friends, assets etc., and create as many lists as you need for different purposes. Each can hold details of up to half a million contacts. (Function-limited demo).

### • Idex 1.0

(Win3.1/95/NT)  
Idex is a flexible new database application for organising and sharing files of any sort. Powerful facilities for searching for your assets including text search, keyword

search and thumbnails of image and movie files. (Limited demo).

### • Master Planner 2.0

(Windows 95/NT)  
A graphical Windows 95 version of a wall planner,

presented as a grid, with names of employees down the left and dates across the top. Add icons to indicate the activities of employees on selected dates — holidays, project work, conferences and so on. (Function-limited demo).

### • MLC Analyze Lite 1.2

(Windows 95/98/NT)  
Get the feedback you need when setting up a TCP/IP network. (Limited demo).

### • ReadyReckon 1.00

(Windows 95/98)  
ReadyReckon is a program for calculating areas and volumes, and evaluating the quantities of various materials needed. Save the results to file or output them from your printer. A conversion utility is provided to convert particular units to any other. (Limited demo).

### • SmartDraw 4.02

(Windows 95/98/NT)  
An easy-to-use program that lets anyone draw great-looking flowcharts, diagrams, forms and other business graphics. You don't have to be an artist to get good results with SmartDraw. (Shareware).

### • SplatMail

(Windows 95/NT)  
SplatMail adds creative flair to email. Send a SplatNote to a friend, wow your co-workers, or spice-up those plain office notes. (Shareware).

### • Terrapin FTP Browser 2.1.2

(Windows 95/NT)  
Make FTP sites more accessible by



CD-ROM

HELPLINE

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automatically collecting information on the resources held at a site whenever that site is visited. The information is retained and can be browsed off-line, thereby reducing connection charges. (Time-limited demo).

**• Total Pay 3.3**  
(Windows)

This is a new Year 2000-compliant, easy-to-use, payroll package. Individuals can use it to calculate their own wages bill. Accountants can use it, as well, for the provision of client payrolls. (Time-limited demo).

**• Turbo Browser 98 6.1**  
(Win95/98/NT).

Fast-view, convert, print, compress, encrypt, copy, move, paste, delete and batch-process files without leaving Turbo Browser. (30-day trial).

**• TurboZIP 3.0**

(Windows 95/98/NT) An easy-to-use total archive management tool with a range of specialised components to make your computing life faster and more secure. (30-day trial).

**• WhatsUp Gold 3.5**

(Windows 95/NT) Know the status of

a system on your network, or get instant notification when the status of your web, SMTP, POP3, FTP, or news server changes. WhatsUp Gold is the perfect tool if you're responsible for installing, configuring, monitoring and correcting problems with an organisation's network and computer assets. (Evaluation).

**OS/2 Software Netscape 4.04 OS/2 & Plug-in Pack V2.1**

The popular browser technology with an integrated suite of internet

tools for email, newsgroup access and web page creation. Netscape Communicator 4.04 for OS/2 Warp includes Navigator, Messenger, Collabra and Composer. These files can be found on the following path of this month's CD: <CD\_DRIVE>:\handson\software\os2\netscape\ Please ensure that you read and agree with the license information before installing. Details of these products can be found in our *Hands On OS/2* column in this month's *PCW*.

## PhotoDisc



PhotoDisc offers a unique internet photo-library service and we have a preview of the collection on the *PCW* CD. As well as the ten on the disc, there is access to 74,990 other stunning images direct from the web. From the web site at [www.photodisc.com/uk](http://www.photodisc.com/uk) you can search, purchase and download the entire collection of images. According to the company, these are of the highest standards, which has led to it becoming one of the world's leading sources for royalty-free images. If you need to download an image quickly and easily, visit the site direct from the *PCW* CD by going to the Content Links section of CD OnLine (accessible from the front screen).

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## ICV Entertainment Section



**ICV Entertainment** brings you another exciting section packed full of video and music, and this month there's another exclusive film trailer and four tracks from a very mixed bag of today's top musical talent.

**Star Trek: Insurrection**

Captain Jean-Luc Picard gets word that Lt. Commander Data has run amok and taken a cultural survey team hostage. But his first concern is to save Data who will have to be destroyed if he cannot be repaired. Patrick Stewart and other regulars from the TV series feature in *Star Trek: Insurrection* marking a new milestone in the Enterprise's continuing mission.



**Music Videos**

A selection of exciting videos with something to suit everyone's taste. There's Robbie Williams singing a classic from The La's, live, Cliff Richard getting operatic on the beach and Vanessa-Mae on violin, plus Darkstar previews their latest single "Graceadelica".

**▲ WE'RE ALL LISTENING, SO PLAY THAT FUNKY FIDDLE, VANESSA-MAE**



## VNUNET [WWW.VNUNET.CO.UK](http://WWW.VNUNET.CO.UK)

Vnuset.com offers speed of delivery, accuracy and breadth of coverage from five market-leading weekly newspapers: *Computing*, *Accountancy Age*, *PC Dealer*, *Network News* and *PC Week* generating up to 50 stories every day of the working week. With correspondents in Europe, the US and Asia contributing daily to our VNU Newswire, a round-the-clock news service is available exclusively at vnuset.com. More detailed information is available in a wealth of in-depth articles, covering news analysis and product reviews, from VNU Publications' stable of monthly periodicals, including such titles as *Personal Computer World* and *Management Consultancy*, as well as some of the best editorial material from VNU Publications' portfolio of 15 business and consumer titles.



## JOBWORLD [WWW.JOBWORLD.CO.UK](http://WWW.JOBWORLD.CO.UK)

Jobworld.co.uk is a free service which provides you with access to thousands of new IT, business and finance vacancies every day. All you have to do is browse the site by job sector or search on a specific set of job skills or requirements. The Jobworld Email Alert service offers an extra bonus by sending only those details that match the job seeker's preferences, allowing the recipient to control exactly what information is sent and when. Jobworld also offers links to job sites overseas, a guide to IT contracting and comprehensive lists of jobs from the top recruitment agencies in the UK.



[www.jobworld.co.uk](http://www.jobworld.co.uk) — *be the first to know!*

## PCW CD OnLine

### Access the internet direct from the opening screen!

If you would like to find out more about any of the software products contained on this month's cover disc and you are connected to the internet, you can visit the software manufacturers' web sites via the Content Links of the CD-Online section. Simply click on the web link banner at the top of the main screen to run your browser and access PCW CD OnLine direct from the disc.

You can access the PCW web site from CD OnLine in addition to Vnuset.com and Jobworld.co.uk. And, if you are interested in any particular product or section of the CD, the Content Links section allows you direct access to the latest information at the live company web sites. You will also find live, up-to-date, technical information about the CD and

## CompuServe trial

You can enjoy one month's free membership, including:

- FREE unlimited access for one month (see note, below)
- FREE online tour of CompuServe
- FREE email address
- FREE 5Mb web space

CompuServe is the UK's most exciting online internet service, offering fast and easy access to the internet and its own exclusive online services. CompuServe organises the internet into easy-to-use categories so that you can find what you want at the touch of a button. Go shopping, book holidays and flights, find out about the latest films, keep up-to-date with news as it happens, or simply keep in touch with family and friends around the world with CompuServe email.

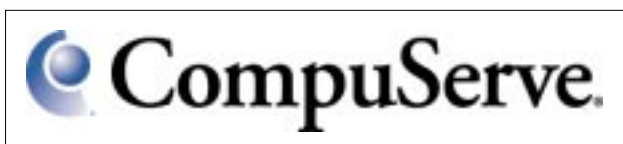
*Note: The free online time is available during the first month after registration only, subject to our Fair Use Policy (GO UKFAIRUSE). You must be 18 years old or more to register for CompuServe membership. Premium Services (these are clearly marked) carry a surcharge and are excluded from the free online time. After your free trial, your membership will continue and payments will be charged automatically when they are due unless you decide to cancel your membership.*

### PCW DETAILS

**Platform**  
Windows 95 and 3.1

**Limitations**  
One month's free membership, unlimited access

**Contact**  
0990 134819



there's even a preview of what will be on next month's disc! And if you've enjoyed the magazine and the CD, you will even be able to subscribe via email while you're online!

▲ **WITH PCW CD ONLINE, THERE IS A WEALTH OF INFORMATION AVAILABLE AT THE CLICK OF A MOUSE**

**CD-ROM**

**HELPLINE**

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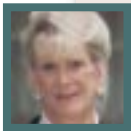
**VOX POP**

Views on IT 1999-style  
Collected by Sue Pederson



**ROBIN BLOOR, CEO, BLOOR RESEARCH**

E-commerce is going to go wild...especially with the sale of holidays and airline tickets. By the end of the year it will be obvious that the electronic economy will subsume the rest of the economy. Java will start to mature and applet applications will appear, especially on PDAs and mobile phones. There's been [some] disappointment around Java but it will make a second coming. Linux will continue to gain popularity.



**GWYNETH FLOWERS, MD, ACTION 2000**

Bigger businesses have taken action [on the millennium bug] but the big worry is smaller companies...too many have not made preparations. I am also concerned about embedded systems...The problems will be sporadic but they'll cause disruption. We will have incidents throughout 1999 but hopefully they will all be short term. The most important thing is to ensure that there isn't a panic in the run-up to the new year.



**CHRIS BAKOLAS, DAN TECHNOLOGY**

I'm looking forward to seeing what happens to AMD, with Intel very aggressive with its low-end CPUs. I can't see many people buying those low-end PC bundles. You either have to cut the quality or the quantity of components. The peripherals bundled with them are a pile of junk. If you pay peanuts, you get monkeys. Customers won't buy the Xeon either, unless Intel cuts the price. We'll see the same kind of PCs, with more memory, and more with DVDs — goodness knows why. Flat screens will also become more popular and will fight it out with 17in screens.

# Windows is dead! Long live Windows!



## Be beats the behemoth

Gates is being challenged — and beaten — even on his PC home ground.

The amazing new BeOS 4.0 operating system, free of the need for backward compatibility, makes Windows look a sluggard with multimedia.

Even developer Be does not suggest you use it to replace Windows — at least, not yet. But the OS, which packs audio, MIDI and video processing (plus a browser),

bundles a dual-boot utility. So, at an introductory £50, Be reckons you can afford to load it for doing just what it is best at, such as coping with many multimedia data streams (*above*) with no Windows-style hiccups.

Be, founded by French former Apple exec Jean Louis Gassée, wrote the first BeOS for the Mac. BeOS 4.0 is the first "proper" PC version, with wide driver support.

Be [www.be.com](http://www.be.com); Computer Warehouse 0181 400 1298

**More serious** than court cases (possible Y2K bug claims aside) is the technological tide. Computers are diversifying into all kinds of devices which need neither Microsoft software nor Intel chips.

On PCs, Intel faces increased competition from cloners. The **BeOS** (see above) offers a fast alternative to Windows for multimedia use. Linux offers

not only an alternative operating system, but also a new model of software development

Microsoft and Intel are not about to go away; and Windows, short of Armageddon, *couldn't* go away. But, as I argue further at the start of our Comdex report overleaf, their absolute rule is over. It's a case of "King Windows is dead. Long live Windows!" **CLIVE AKASS**

# First steps on fast track to future

The most momentous IT events of the past year were home grown and we have hardly started to feel their effects.

Digital television will catalyse myriad changes. It brings fast data to homes cheaply for the first time and will give the web a mass market.

Cable companies and BT have to upgrade land links to keep pace. Britain is getting its first cable modems and British Telecom has piloted a

rollout of ADSL (Advanced Digital Subscriber Line).

Just as important as the bandwidth these land links bring is the fact that they are always on. This is likely to change the predominant use of the net from pull to push.

It will also change the nature and revenue streams of broadcasting. Users will be able to choose when they see some programs, and access TV and radio archives. Advertisers will be able to sell

direct, generating the electronic economy. All this is coming to your home soon. BT Internet director John Swinge-wood sees ADSL, rolled out region by region, being in place across Britain in two years. Pricing has yet to be set but in time it could be free, paid for by e-trade and advertising.

**COMDEX SPECIAL starts p26**  
Slim mobile vs thin client p27  
2 megapixel digicam ceiling p29  
TV PC hacking curbs p45

INTERNET

# Users flock to 'no pay' web link

Dixons claims its free web service, Freeserve, attracted nearly half a million users in two months. It defied gloomy predictions by doing so with no major glitches.

Now, Virgin Net is believed to be on the verge of making its service free. It says few users have defected to Freeserve although it is getting fewer new subscribers.

Freeserve is the fastest-growing service provider in the UK, attracting 8,500 new members a day. By last month it had boosted Dixons share value by £690m.

Analysts were pessimistic about Freeserve's chances, predicting crawling connections and curbs on membership numbers.



Dixons says it is extremely happy with the service and that it has no plans to cap numbers. Press officer Justine Moon said: "We are adding new content all the time. Freeserve will continue and it will always be free."

**Free internet services** will become common, says Ovum's internet consultant, Daniel Bieler. "Companies are subsidising free services because in the long run they hope to increase the user base."

The more people who overcome their psychological issues about buying online, the more opportunities the companies have to sell."

He is slightly sceptical about how many people are actually using Freeserve. "It's one thing to have another internet account and another thing to have an active subscriber," he said. "People may just be signing up because it is free. I don't think you will find each person who signed up, surfing all the time." Dixons says that 40 percent of its members are new to the net.

**BT claims** that its pay-as-you-go Click service is outstripping its expectations. David Pincott, press officer for BT Internet, says that its regular internet service will have to stay on its toes. "It is up to us to provide the type of quality and content that will justify the monthly fee."

ADSL (see opposite), which Virgin and BT Interactive are both piloting, may also cause a shakeout of providers who cannot deliver data at 2Mbps.

SUSAN PEDERSON

## short stories

### BLAST FROM THE PAST



This man changed your life. If you use a spreadsheet, that is. Dan Bricklin invented the things in 1977 when he was at

Harvard. Now he heads Trellix, vendor of the eponymous web publishing package. I snapped him at Comdex, announcing that Trellix will be bundled with Corel's Wordperfect 2000 office suite. Corel said it is posting a free Linux version of the suite. — CA

### DANMERE

We were a digit out, last month, on our number for Danmere (p42) which is a way of storing PC data on your video recorder. The number is 01606 74330. [www.danmere.com](http://www.danmere.com)

### LAST WORD

• A story doing the rounds at Christmas was that German PC maker Seimens is moving to Staines. Probably inspired by Monica Lewinski's dress...  
• English nuance can be perilous. Witness what French-founded OS developer Be calls its online software shop: BeWare.

## Dixons in PC 'fair trade' probe

Claims that Dixons asks too much for its PCs are being investigated by the Office of Fair Trading.

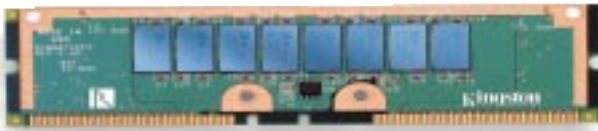
Dixons, which owns PC World and Currys, was criticised by no less than Craig Barret, CEO of Intel. Its pricing has also been

criticised by Fujitsu. Trade Secretary Peter Mandelson called in the OFT after the Consumers' Association asked for an inquiry.

A Dixons statement said it offered Britain's "most competitive prices" and welcomed any inquiry.

MEMORY

## Latest RAM buses in



This is the next-generation Rambus memory module (RIMM) which should start appearing in machines this year. Direct Rambus PC memory promises three times the effective bandwidth of an SDRAM-100 system, at

comparable cost and lower power. Dell has received its first sample RIMM modules from Kingston and Toshiba's components division — they aim to maintain supplies to systems with Direct Rambus memory architecture this year.

IAN ROBSON

## Oh baby, it's a PC world!

Nothing like catching them young... you can now buy the PC equivalent of those wooden books designed to introduce babies to reading.

Parents keen to set their bundles of joy early on the ladder of IT success, can buy "lapware" called *Jump Ahead Baby*, designed by Cendant-owned Knowledge Adventure with the aid of psychologists. It costs £11.99 at high-street stores. [Cendant 0118 9209100](http://Cendant01189209100)



"Baby-learning, indeed... I just hope she's learned the difference between a PC keyboard and a potty"



◀ **Gates plays a video game with motocross rider Rusty Crank, on stage at Comdex**

Microsoft is finished. Oracle chief Larry Ellison spent much of his keynote speech deriding Microsoft's new Sequel 7.0 Server, which is being

## Get Gates!

It's been "Get Bill" time. First there was Clinton undergoing ritual global humiliation for messing with his groupies. Now we've had Gates stuttering his lapses of memory to the DoJ trustbusters, and losing the first round of a legal battle with Sun for trying to hold back the Java tide.

"I've had an exciting year," said Gates in his Comdex keynote, showing the famous picture of someone throwing a pie in his face. At Comdex, too, he was under attack. *Wired* magazine put out an issue listing 83 reasons why

touted as the plain person's doorway to data. Ellison also announced that his latest Oracle database engine dispenses with an operating system altogether. Yah, boo! Take that, Gates!

It is hard to overstate the venom with which Ellison and Sun CEO Scot McNealy view Gates. Monumental egos both, you get the feeling that they mind most being beaten by a man who still looks like a smart-ass college kid who can't quite make the in-crowd.

The feeling is mutual. A very high-up Microsoftie went apoplectic on me once when I

made the mildest of remarks in favour of Java. "Don't you know that all those guys want is to destroy Microsoft?" he exclaimed, irony free.

Windows is not about to go away. Not Java, nor Linux, nor Epoc, nor any operating software combined can match the breadth of its use. Microsoft software runs 90 percent of the world's desktops and most of the world's businesses. There is no way this is going to change in a hurry. But the Windows era, the time when personal computing meant PCs and PCs meant Windows, is over. Comdex, a good annual snapshot of the IT industry, showed cameras, TVs, radios, phones, pagers... all manner of intelligent devices using not a line of Microsoft code.

True, there were also many using Windows CE, but they could just as well have used another operating system — better, because designers of mobile devices can play, free of the PC legacy. There is no reason to hand this arena to Microsoft.

Small matter that the cluster of Linux stalls was dwarfed by the CE pavilion. Linux will grow because people want it to: like the web's HTML, it is as free as English and they can grow it themselves. Small matter that Java cannot match the speed of native Windows apps. It will get faster as processors get faster and code gets tighter.

The fact is, without the help of the DoJ, without even the new AOL-Netscape-Sun axis, Microsoft is losing its monopoly. It is going the way of IBM: huge and growing, but no longer cock of the roost. Bill Gates has had his day as ruler of the IT world and his Windows is beginning to look like the pacemaker for better things to come.

But Gates is not friendless. Talk-show host Bill Maher, who knows shark-eats-shark when he sees it, raised a cheer at the Intel keynote when he cracked: "They kicked his ass because he was too successful."

CLIVE AKASS

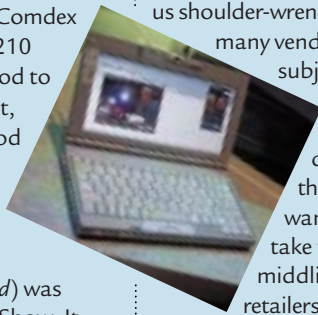
[www.pcw.co.uk](http://www.pcw.co.uk)

### POINT OF VIEW

## Going mobile with a true mobile

You may have noticed that we at "PCW Towers" have been drooling over the PCG-505G Vaio mini-notebook. Sony let me take one on my Comdex trip. I also took a Kodak DC 210 digicam. The Vaio was as good to use as it looks: sleek, efficient, and actually portable. It stood up well to the journey, too. Being fickle, though, I fell in love with the Vaio's young sister, previewed at Comdex.

The Vaio PCG-C1 (pictured) was definitely my Product of the Show. It looks like a foreshortened 505. The 8.9in screen is crisp and easy to use. Above it, set into the lid, is a tiny camera so the



Vaio can be used as a video phone. It baffled me for years why no-one built true portables like these, instead offering us shoulder-wrenching luggables. The many vendors I earbashed on the subject all claimed a lack of demand.

Camera makers cling to a similar myth that digicam users don't want the controls you take for granted on middling film cameras. Big retailers, I'm told, have decided that only simple models will sell. I'm a snapper rather than a photographer

but I find this hard to understand. I use a digicam as a visual notebook, creating instant images that would be too much hassle using film. They may be just snapshots, but they still need fine controls, at least until "automatic" cameras can truly cope with poor light.

The DC 210 is no worse in this than others of its class, and it did me proud. If you get one, I advise you to buy a PC Card adapter for the flash card to speed downloads and save batteries. The megapixel resolution gives scope for cropping, which you need when you don't have the lenses to frame a good picture.

• Two-megapixel ceiling — see page 29

Clive Akass



goes on the road with laptop and digicam

You can see these stories and much more in our special web report on Comdex Fall, which gives a

## INPUT SYSTEMS

## Life without mouse or keyboard

The new interest in mobiles, and the fact that a keyboard dictates the size of most devices, has fuelled experimentation with input systems.

Speech-driven mobiles have yet to leave the development labs although Pilot Island showed an add-on called the Parrot that lets you control a PalmPilot by voice. It also, like some Palm clones, supports voice memos.

Lernout and Hauspie showed off its Voice Express Plus for PCs, which accepts natural language commands and sells here for £80.

Dragon Systems showed its Natural Speaking Professional package taking input from a Sony mini-disc recorder — check its web site for other models that work.

Voice input can involve wearing a mic to cut out extraneous noise. Andrea Electronics claims to have got round this with a far-field mic using a new Intel-backed technology called Digital Super Directional Array. Products are expected soon.

There were a couple of ideas on how to replace the mouse. Casio uses a thumb pad to the right of the display on its trim 1.82lb new Cassiopeia Fiva mini-notebook (above). Lefthanders will not be happy with it, though.

Another bright idea came from a company called Concept Kitchen. It's a stylus that fits on your finger

(right). It means that you can use a keyboard and touch-screen

without having to keep picking up a stylus. At \$19.99 it ain't cheap, but it is made of silver.

See our PCW web site for links



## MOBILES

## Slim laptop versus thin client

Mobiles have divided into two classes: those using full Windows, or those using a compact operating system like CE or Epoc. The divide boils down to a choice between machines with a high price, high spec and low battery life, and cheaper models that can run basic apps for a working day without a battery charge.

Sony's Vaio 550 set the pace for mobiles and had more than one imitator at Comdex, including near clones from Hitachi and Toshiba. The pen-driven Palm series has established a considerable following, as evidenced by a wide range of software and peripherals (see left and our PCW web site for details).

CE dominated the other handhelds, including pen-driven



PalmPilot lookalikes from Casio, HP and Uniden.

More directly competing with thin laptops were the new CE-bagables; too large

Starfish, whose software runs the Rex PC Card organiser, will develop synchronisation software for Symbian's Epoc operating system used on Psion palmtops, ceo Philippe Kahn said. Full story on our web site

for your pocket but small and light enough to carry in your bag. One imaginative design, the Vadem Clio, is also sold by Sharp under the name Mobilon TriPad. It can be used as a pen tablet (left), laptop (right) or (above) as an easel for presentations.

Intel does not hold sway in this area. The TriPad uses a MIPs processor and

Hitachi uses its own SH-3 for its HPW-200EC, which has a laptop-size keyboard and half-depth VGA screen.

HP's new Jornada 820 handheld was on show, due to ship in Europe, in early 1999, for 957 Euros (about £684). It weighs 1.13kg and has a claimed 10-hour battery life, a built-in 56K modem, "instant on" and simple synchronisation of email and other data.

The larger mobiles are aimed mostly at business users and can act as thin clients running

Windows apps across a network using Windows Terminal Server.

See our PCW web site for links

• Sharp's Mobilon Pro PV-5000 will cost about £800, not £80 as we stated last month.



## Home, home on the network...

There are those who claim that home users can barely cope with a PC, let alone a network. If so, lots of people are going to lose a lot of money invested in the idea.

Peracom showed a system you could imagine people actually using. It used plain old coax cable, as used on your TV, to transport audio-visual and data signals so that you could view your TV or DVD player on your PC, or check out any PC in the house via your TV. A combined remote control and radio mouse allowed you to control a PC via a TV; so much for Johnny playing video games when he should be doing his homework.

Sharewave and Philips jointly developed a radio product called Ambi which similarly allows you to net-surf or run PC programs on

any TV in the house. Epigram announced technology that can provide 10Mbit/sec links using a standard phone line. Intel, AMD and Tut are developing similar systems although there is doubt whether they are allowed to, under UK telephone regulations.

Proxim demonstrated its Symphony range which provides 1.6Mbit/sec networking via 2.4GHz radio links. There are four products in the range: a \$149 ISA card, a \$199 PCI card, a \$299 56K modem which allows more-than-one-use net access simultaneously, and a \$399 Ethernet bridge for use with a cable modem or ADSL link. Proxim uses its own protocols but is a member of the Home Radio Frequency Working Group which is trying to thrash out standards.

**STORAGE** Cheap

**Orb takes on Jaz**

A \$199 fast drive was launched by Castlewood Systems — set up two years ago by Syquest founder Syed Ifitkar. The Orb has a claimed transfer rate 50 percent faster than rival Jaz, and cartridges a quarter of the price at around \$30.

The initial EIDE model will be followed by parallel and Ultra SCSI versions in the new year. European shipping times will be later. The launch came as Syquest went into Chapter 11 protection, and Iomega showed a 250Mb Zip drive which will cost \$199 in the US. It will read 100Mb Zip disks; the 250Mb ones will cost \$16.65.

Storage technologies competing for use in small devices include IBM's microdrive (see far right) and Iomega's Clik!

which takes tiny 40Mb disks. Iomega has yet to say when it will ship.

Sony showed what it calls a Memory Stick, (left), a 4Mb or 8Mb slug the size of a piece of chewing gum for use in digital appliances.

The company claims the device is more robust than compact flash.



Fuller versions of these stories and more are on our site at [www.pcv.co.uk](http://www.pcv.co.uk)

**DIGITAL PHOTOGRAPHY**

**2 megapixels — that's your lot for digicams**

The resolution of digital cameras for all but professional users will stop at two megapixels — just twice that of today's middle-priced machines, a top Nikon executive claimed.

"The resolution wars will soon be over," Nancy Carr, general manager of Nikon's consumer digital group, told a Comdex seminar.

Megapixel cameras have fallen drastically in price. The Kodak 210 now costs £399 and offers 1152 x 864 resolution, enough for photo-realistic 5in x 7in prints.

The resolution of a 35mm film is equivalent to 13 megapixels, and two megapixels are considered necessary for 10in x 8in prints.

Carr argued that few need that kind of resolution, and the processing power and storage required would make cameras too expensive.

Intel general manager Don Whiteside said Carr underestimated the growth of processing power and he believed higher resolutions were needed to allow people to crop their pictures.

Representatives of the big camera companies agreed that digital photography will have to be made as easy as film if it is to get a foothold.

Willy Shih, vice-president of Eastman-Kodak, observed: "We are used to thinking of digital being better than analogue. But photography is one area where this is not true."

Sony's latest Mavica, the **FD91**, does not use its new 200Mb HiFD super-floppy but it does allow you to capture up to 60 seconds of video onto a standard floppy.

It takes still pictures up to 1024 x 768 resolution. It will cost \$999 in the US.

Canon showed its **Power Shot Pro70** which offers a 1536 x 1024 resolution and a 28-70mm optical zoom, burst, and two Compact Flash slots: one a CFII which can take IBM's 340Mb microdrive (below, next to a US dime).



**Backplate could digitise your SLR**

Nikon may produce a backplate that can transform a film SLR camera into a digital one, hinted Nancy Carr, general manager of Nikon's consumer digital camera group.

Digital adaptations of leading SLRs have been available for at least three years for between £7,000 and £10,000 — several times their component costs. One company has shown, but not shipped, a universal 35mm

backplate with its guts fitting into a cylinder the size of a film cartridge.

Most photosensors are smaller than a 35mm film, so the view they see is smaller. Otherwise, there seems to be no great problem in replacing the film by a sensor, logic and storage. Carr said Nikon had explored the idea. "All I can say is 'watch this space'," she told journalists after the digital photography seminar.

**CONNECTIVITY**

**USB goes mainstream but the old RS232 goes faster**

The USB bus, long tipped to replace both the parallel and serial port on the PC, hit the mainstream for the first time this year — more than three years after vendors began fitting USB ports to PCs.

But there is life in the old RS232 serial port yet. An Oxfordshire firm announced a chip which can push 15Mbit/sec through one,

more than 100 times faster than a normal serial port and 25 percent faster than a USB.

The chip, from Oxford Semiconductors, is a pin-for-pin replacement for the 16550 UART chip which drives most PC serial ports. It can allow much faster



devices to use the RS232 — the standard version of which can be overloaded, even by a 56K modem. But it lacks the other advantages of USB such as hot-plugging and the ability to daisy-chain devices.

Almost every peripheral you can think of is now

available with a USB link. One of the more interesting, of which there were several examples, was a USB-Ethernet adapter which would allow laptops, say, to link to a network via the USB port. The one pictured left is from Belkin.

Oxford Semiconductor [www.oxsemi.com](http://www.oxsemi.com); Belkin [www.belkin.com](http://www.belkin.com)



## DISPLAY TECHNOLOGIES

# E-book breakthrough

Researchers at pioneer CDT have got the blues and they are delighted. Their **Light-Emitting Polymer (LEP)** technology is tipped to drive the next generation of screens.

They demonstrated a monochrome screen a few months ago but at the time they could only obtain red or green displays.

Blue, because it uses higher frequencies, is more difficult to achieve, but they have finally done it, leaving the way clear to combine the three

colours into a full-colour display — work the company is doing in partnership with Epson-Seiko.

LEP screens have a number of advantages. They should be easy to make and can be fairly flexible. Most importantly, they use a twentieth of the power taken by a TFT liquid crystal for a given luminosity level. This is because, like your Light-Emitting Diode (LED) status indicators, they generate their own light. Liquid-crystal displays are inherently

less efficient because they work by differentially blocking an external light source.

CDT development manager Carl Towns could give no date for when LEP colour screens will ship.

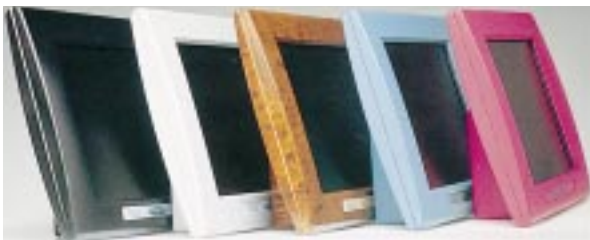
“We should have a demonstration screen by the middle of next year [1999],” he said.

LEP screens would be the nearest that displays have come to the convenience of paper, and could lead to the first practicable electronic books.

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[www.cdttltd.co.uk](http://www.cdttltd.co.uk)

### Slim PCs

These may look like screens, but they're full-spec PCs from Italian firm Seco (+39 575 26979). Details at [www.seco.it](http://www.seco.it)



# Monitors: the third way

Want to increase productivity by upgrading hardware? The old debate as to whether to buy RAM or a new processor has a third contestant, say researchers.

It seems reasonable that monitor size and quality should be relevant, but there has been no evidence for this since the days of monochrome, text-based displays.

**Tests at City University** for the Computer Suppliers Federation were carried out with volunteers on a selection of de-badged monitors of varying quality and size (14, 17 and 21in). They were asked for subjective ratings after carrying out tasks which included proof-reading, reading values from a bar chart and data searching on a spreadsheet. Care was taken to ensure a level

playing field: in the chart-reading and proof-reading tests, the screen resolutions were set to ensure that corresponding bars and characters utilised the same number of pixels.

**Surprisingly**, the 21in monitors did not sweep the board: a “poor quality” 21in performed worst in the bar-chart test; a 17in “good quality” monitor scored best in the proof-reading test and was by far the subjective favourite. The 21in only came into its own when reading values from large spreadsheets — not having to scroll the display halved the search time. But with a 17in display, the accuracy in the bar-chart test improved by ten percent and both reading speed and accuracy improved by five percent.

TIM NOTT

# AOL aims for US top five

AOL's buyout of Netscape quickly became Silicon Valley's most important story of the year. Microsoft's Department of Justice trial is a hot item too, but this one really hit hard. Netscape re-energised this area and put it back on the map. Some mourned the end of an era in which a small start-up could, in a very short time, achieve importance all over the world. Others said that Netscape's days were numbered anyway. Many saw the merger as part of the consolidation of an industry in which a handful of companies own 75 percent of the market. To an extent, all these assessments are true.

**To understand** what is really happening, you need to recognise what AOL chairman Steve Case wants the company to be when it grows up: the fifth major US network with ABC, CBS, NBC and Fox (CNN is considered a specialised news channel). He wants it to become the main way in which text, audio, animation and video is delivered to homes. And he is laying the groundwork to take advantage of high bandwidth when it is finally delivered to the home.

Case eventually wants to deliver interactive news and even an interactive sitcom. And this two-way approach is not his only advantage over traditional broadcasters. They have only a general understanding of who are their viewers. AOL has addresses, names, phone numbers, demographic data, even credit-card information and purchase records. In addition, Netscape's Net Center gives him eight million new users and a business-to-business e-trade site, revenues from which will help him buy time until high bandwidth is available in homes.

**These plans do not include** Netscape's IT products, which Sun took off Case's hands. This is also why Case is not in a hurry to switch from Microsoft's Explorer to Netscape's Navigator browser. He cares only that either browser can deliver his content. The merged AOL/Netscape could be the most important “network” in the early 21st century — that is why this merger is important.

This is an end of the first Netscape era but the start of a new one in which the company could rewrite the rules of television, radio and information delivery.

**Tim Bajarin**   
 letter from **Silicon Valley**

Y2K ROUND-UP

# Countdown to Y2K

Some government departments are failing to cope with the Year 2000 problem, warns the independent consultancy group on Year 2000 issues. Nine government departments were described as high risk in a report by Taskforce 2000.

The author of the document said that a full audit of government systems would probably show the real situation to be far more serious than the report indicated. Among the nine departments named are the DTI, the Ministry of Defence and the Home and Foreign Offices.

The British Government, meanwhile, said it was making good progress in readying itself. The Leader of the House of Commons, Margaret Beckett, said that two-fifths of government departments and agencies were near to completing their work on critical information technology systems and three-quarters were more than half-way to completion. She said the Ministry of Agriculture Fisheries and Food, and Customs



and Excise, had made impressive progress, but she was still concerned about the Inland Revenue and the Driver and Vehicle Licensing Agency.

- **ICL says that companies** should test their office building systems, having discovered that chips embedded in its own premises were vulnerable to the millennium bug. Tests conducted on its own premises revealed potential failures in a number of critical systems. The bugs could have left the company without working telephones, building access systems and fire alarm panels.

- **Air traffic control systems** are almost completely safe

from the millennium bug, the group that runs communications networks for 650 of the world's airlines and airport authorities has stated. But it refused to completely rule out the risk of failures and admitted there will almost certainly be problems in some parts of the world. It claims that its network is 99 percent compliant.

[www.bug2000.co.uk](http://www.bug2000.co.uk), [www.taskforce2000.co.uk](http://www.taskforce2000.co.uk)

## When the data is dead, it stays dead

Companies worried about what could happen to sensitive information on their old PCs can breathe easier with two new data destruction products. Launched by Technical Asset Management (TAM), the Sanitizer and Shredder range of products can make

sure that when your data is erased, it stays erased. The Sanitizer works by overwriting every bit of data on your hard drive and starts at a price of £155 (ex VAT) for a disk that will wipe data from ten drives. The Shredder, which costs £155 (ex VAT) for a single-user copy,



tackles individual files rather than the entire hard drive.

## Face the facts

A typeface specialist, Faces has found that the font you use can say a lot about you. It says that people who use Times New Roman are accurate, assertive and

### What do you mean, I'm impatient??

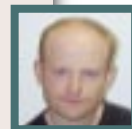
unwilling to compromise. Those who choose Helvetica are likely to be talkative, a bit impatient and have a no-nonsense manner.

## VOX POP

Views on the year ahead  
Collected by Sue Pederson

### GORDON LAING EDITOR

My prediction for 1999 is convergence. The digital set-top boxes of 1999 will have decent web and email capabilities, turning the TV into the deserved entertainment and communications centre of the home.



### NIK RAWLINSO REVIEWS EDITOR

1999 will see a net explosion. The development of free access and email providers, along with the likes of free site hosts, will open the net to the UK masses, enhancing both global communication and an understanding of the collective localised identity.



### ADELE DYER FEATURES EDITOR

Mobile computing will take great leaps forward. In 1998 there were some amazing ultra-portable laptops and powerful PDAs. This year will see the introduction of lighter devices running more impressive OSes with greater connectivity. GSM connections, net access and dock solutions will be standard, and expect to see digital cameras built into several models.



### IAN ROBSON SENIOR STAFF WRITER

In 1999, Digital Versatile Disc will break from its current low-key prominence. With specific authoring it will be able to take advantage of the huge capacities this medium can offer. Initially, expect games with Dolby Digital Sound and high-quality movie clips.



## short stories

### TALK TO THE NET

L&H will soon let users talk to the internet. Its newest technology uses L&H's natural language-understanding technology to grasp the user's question, then goes out on the web to find the information and read it out using a new text-to-speech system. Because the system does not bother to download the images from the web sites it consults, the response is almost instant. The technology is expected to be embedded in products by the middle of next year.

[www.lhs.com](http://www.lhs.com)

### MONEY TALKS

Cable & Wireless has joined eCHARGE to launch a new form of payment for internet content. Unlike other micropayment schemes, eCHARGE payments are made directly to your phone bill. To access premium content, users are automatically transferred to a previously agreed premium call charge rate. Once the download is complete, they can transfer back to the usual local call charge rate.

[www.echarge.com](http://www.echarge.com)

### NET TALKS TO THE BLIND

Blind and partially sighted people can now join an internet access service which has been specially adapted to their needs. The service, available from UK ISP Direct Connection, uses text translation software to negotiate the internet and email. It's available for the same price as a regular dialup account. Users can also get a regular account for sighted members of the household for an extra £2.50 per month.

[www.directconnection.com](http://www.directconnection.com)  
0800 072 0000

## INTERNET NEWS FROM COMDEX

# Panel fears web power loss

Widespread web power-outages are likely to occur over the next few years, creating chaos, it was claimed at Comdex. Dave Holtzman, senior vice-president of solutions at Network Solutions, made the claim at a panel discussion called "The Internet Crystal Ball: the future of the internet".

"We'll see several large brownouts, maybe due to fibre technology or switches but they'll probably be DNS-related. A year ago, if the net went down for a day it was OK, but if it happens now there'll be havoc," he said. "Until I started to look into it I had no idea that the DNS infrastructure was so fragile. The outage won't be permanent but it will scare people. If it happens next year, though, people will just blame it on the year 2000."

Holtzman also claimed that one of the biggest barriers to the growth of the internet is the lack of available IP addresses. The convergence of appliances



▲ POWER OUTAGES: THE LIGHTS GO OUT ON THE WEB

will continue to a certain point and then stop because they all need IP addresses, he explained.

"Power companies are requesting IP addresses for every outlet — and that runs to millions — but the problem is there's just not enough, and IPv6 is at least three years from widespread adoption," he said. Holtzman expected to see geometric growth in the adoption of domain names,

however, with 100 million expected to be in existence within three years.

A more positive note is that panel members also expected the cost of web connection to plummet over the next 18 months as DSL takes over from ISDN (see p24). This will most likely lead to two-tier web sites aimed at different segments of the market: one tier to deal with fast internet connections, and another aimed at users with slower means of access.

CATH EVERETT  
(LAS VEGAS)

## Travel log

Microsoft has launched a UK version of MSN Expedia, its internet travel service. The new service, Expedia UK, is Microsoft's first UK e-commerce initiative and has been launched in conjunction with Thomson Holidays and British Airways. Users can choose from a complete range of services including last-minute holiday bookings, separate flights, hotels and car rental. Visitors to the site can also peruse destination guides, which come

complete with maps, currency converters and links to other travel sites.

[www.expedia.co.uk](http://www.expedia.co.uk)



## Machines start talking back

**T**he future will see **man and machine interacting** on a level that most of us cannot yet imagine. Many leading companies in this field have their roots in Cambridge University's renowned Speech, Vision and Robotics (SVR) lab, which for six years has come top in US Advanced Research Projects Agency evaluations of natural language processing.

**Entropic** has just announced its first contract in partnership with US telephony specialist **Interactive Voice Technology (IVT)**. Until recently, Entropic focused on supplying speech-development toolkits to schools. The IVT deal involves providing call centre solutions for general portal services.

Entropic's award-winning Graphvite natural speech development kit will be allied to IVT's NT-based voice response systems. Entropic's products are based on HTK, a toolkit for building high-performance speech-recognition systems. Entropic has exclusive access to new research as it

becomes available from the SVR lab, to help provide facilities which the company says "makes users think they are actually having a conversation with a computer." The expanding organisation has received further investment from Amadeus, the Microsoft-backed venture capital fund. Entropic has just taken on a new president from the US, Paul Finke. Steve Young, head of the Cambridge SVR group, remains chief scientist and vice-president of engineering.

Another local company, **Vocalis**, has come up with revolutionary technology to enable people get **web information by phone**. SpeechHTML, launched at the recent Voice show, allows you to ask a site for information using spoken commands.

Vocalis builds a range of voice-activated telephony products for network service providers and clients worldwide, defining the way people interact with machines. The new service has been offered to 1,000 companies as a pilot, and a full service is due to be launched early next year.

"Interacting with a web site via speech creates a whole new dimension to the internet phenomenon," says Mike Williams, Vocalis' business

development director. He claims SpeechHTML gives companies an affordable way to provide interactive voice services.

Voice-activated web access puts Vocalis in a strong position in what is expected to be a £3 billion market for web/telephony services. It means people anywhere in the world can get information from a web site using only a telephone.

"This pilot is the first step in providing every company with a telephone information and transaction service as part of their world wide web facilities," says Williams. Companies taking part in the trial will be given a phone number that they can promote and distribute to their customers.

Vocalis has licensed US comms component manufacturer Dialogic to incorporate its speech-recognition technology telephony cards. This will enable integrators to develop speech-processing systems using standardised interfaces. And, it has just signed a **£2.5 million deal with Ericsson** for a new voice-driven collect call service called SPEECHtel.

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[www.entropic.com](http://www.entropic.com)  
[www.speechhtml.com](http://www.speechhtml.com)

**Caroline Swift**



*continues her reports from Silicon Fen*

## Hong Kong: the price is right

The cost of **consumer electronics** in the East redefines the word 'cheap'. Gordon Laing reports.

**M**icrosoft Office 97, Adobe Photoshop 4 and CorelDraw 8. Yours for under a tenner. Such is the reality of the electronics shops in Hong Kong where piracy rules and the officials seem to be powerless.

**On a recent week's visit** to Hong Kong I couldn't resist a spot of high-tech shopping. However, just like Tokyo's Akihabara, Hong Kong's Mong Kok and Sham Shui Po districts are high-tech only in terms of the products for sale. The shops themselves tend to be small and seedy and the surrounding area draped with rubbish underfoot and neon above. So saying, these are the places to come for electronic bargains and the latest products, many of which will never see the light of day back home.

Every major application and software suite is available on pirated CDs, presented in rather smart packaging. The going rate was three packages for 100 Hong Kong dollars, which works out at about £3 each. One compilation pack which caught my eye was labelled Adobe 98 and consisted of the last four versions of Photoshop, Illustrator and Premiere, with a collection of filters, for just £10.

**Console games players** are well catered for, with Sony Playstation and Sega Saturn

CD games an easy target despite their non-PC file formats. Even the cartridge-based Nintendo 64 couldn't escape, with the cunning pirates selling add-on CD-ROM drives just for playing the ROM games that had been copied onto disc. Apparently some pirates are occasionally raided, but they just reopen across the road, often on the same day.

*Every major application and suite is available on pirated CDs*



DVD movies have the pirates stumped for the time being, although at least the prices were as cheap as you'd find them in the US. Every DVD player was sold as standard, with the ability to play movies from all regions. Players originally hailing from Hong Kong proved a particularly good bet since they share the same

voltage as the UK and usually supported both PAL and NTSC video standards. Hardware, whether computers, consumer electronics

or cameras, cost typically just over half the UK price. Even adding around 30 percent tax and duty at UK customs you can't go wrong, so for major electronics I advise you to get yourself on a plane. My personal favourite top buys were:

➤ **A tiny Pentax Efina APS camera** for only £100. It costs £175 in the UK and represents much better value than

the slightly slimmer Canon IXUS.

➤ **A brand-new Sony Vaio PCG-C1 portable**, little bigger than the average CE

handheld and, as yet, unavailable in the UK but boasting a 266MHz processor, 64Mb RAM, 1024x480-pixel full-colour 8in widescreen display and a built-in videoconferencing camera in the lid, all for just over £1,100.

➤ **And finally**, for those following my continuing search for the perfect home DVD player, a new code-free Denon DVD-5000 with component output, support for DTS, HDCD, PAL/NTSC, 240V, and the first model to be certified as THX Ultra (Lucasfilm's latest high-end badge).

The Sony Vaio remained in the shop window, but at around a grand, the Denon just had to come home with me.

▲ **PRETTY IT AIN'T, BUT HONG KONG'S SHAM SUI PO DISTRICT IS THE PLACE FOR CUT-PRICE PCs AND PIRATE SOFTWARE**

## short stories

### ISP RATINGS

Inverse Network Technology has launched a monthly ratings report in the UK for the 12 leading internet service providers. UK BenchMark grades ISPs on



connection success as well as reliability and speed of downloads. Last October, Virgin Net came first with five grade As, while BT Internet got four.

[www.inversenet.com](http://www.inversenet.com)

### COMPAQ ONLINE SALES

Compaq has followed its competitor Dell into online PC sales in the US. Compaq has traditionally only used dealers to sell its PCs, but says that it will keep them in the loop by offering them a commission on every customer they refer online.

### BROWSERS

## AOL won't axe IE

AOL will continue to ship Microsoft's Internet Explorer as the default browser for its online service, despite its purchase of Netscape's rival Communicator offering.

**Many analysts** speculated that AOL would drop IE after it acquired Netscape in November. AOL provides its customers with a customised version of IE, while in return, AOL has a prominent position on the Windows desktop.

However, Steve Case, chairman of AOL, stated that although AOL had the right to unilaterally terminate the IE licensing deal when it expired at the end of 1998, the company planned to renew it instead. "We believe

that it is important to stay bundled with Windows," he explained.

During the Microsoft anti-trust trial, an AOL executive testified that the firm had opted to use IE so that its icon would be displayed on the Windows desktop. Microsoft disputed this, however, arguing that AOL's choice was motivated by IE's superior design.

Case is now showing readiness to collaborate with Microsoft, however. "There are places where [AOL and Microsoft] can work together, and we're ready to do that. And there are places where we will have to compete, and we'll do that too," he said. This suggests that the recent deals between

AOL, Netscape and Sun are less of an anti-Microsoft alliance than some analysts have implied.

**The acquisition** puts AOL in a strong position in the browser market. Recent IDC data indicated that Netscape still holds 41.5 percent of the browser market, compared with the 27.5 percent owned by IE. AOL's version of IE commands an additional 16.3 percent. This means that if AOL were eventually to switch its online service over to Communicator, the Netscape browser would have a market share of almost 60 percent — more than double that of IE.

VNU NEWSWIRE



## Yahoo have mail



Users now have yet another **free email service** to choose from. Yahoo! rolled out its free Yahoo! Mail service in the UK and Ireland in November. The service, which is similar

to Microsoft's Hotmail, gives users a free web-based email account which they can access from any computer with an internet connection. Yahoo! Mail allows users to create email

folders, search their messages and apply junk mail (spam) filters, as well as set up reminders for important events.

[www.yahoo.co.uk](http://www.yahoo.co.uk)

## COMDEX EXTRA

## Digital TV firms seek curbs on PC hacking

**B**roadcasters will be able to control which programs and how many times they can be recorded, if new security measures are adopted into the standard for 1394, the bus most likely to be used to link digital TVs to recorders.

**It also seems** that the fear of pirate recording and of people hacking into paid-for TV channels, free, has been one reason broadcasters have been unenthusiastic about PCs being used to receive digital TV. Fear of copyright abuse has already delayed the production of digital TV cards for PCs, according to a Panasonic engineer to whom I spoke at Comdex.

Panasonic was showing a card based on the US high-definition TV system, but high-frequency-product specialist Trent Horio said the company had also worked on DVB (Digital Video Broadcasting) cards suitable for European TV reception.

Digital TV facilitates commercial piracy because quality is not lost with re-recording. However, digital content can more easily include copy-protection measures. And at least one UK prototype set-top box has been spotted with a 1394 interface blocked off, perhaps awaiting implementation of the new copy protection measures, which are backed by Intel. Even the designers admit these are not hacker-proof, but they could only be defeated by a hardware device, which would be amenable to legal control.

**The PCI bus**, on which DVB cards sit, is another leakage point for pirate recordings — even illicit decryption of paid-for programs. “We don’t want any copy protection on the PCI bus,” said Horio. “It was not designed for it and I don’t think it would be a good thing.”



▲ **This model home, shown at Comdex, uses 1394 to network IT and consumer devices. The 1394 bus will not go mainstream in a big way until 2000, by which time its maximum data rate will have reached 800Mbps and there will be wireless and optical implementations.**

An American 1394 specialist, who asked not to be named, told me: “I could get around any protection they put on the [1394] bus. If they implement copy protection, you can bet there will be boxes on sale that get around it.”

CLIVE AKASS

## The new e-economy

Tim Bajarin comments on **the rise of e-commerce** and the wide-ranging effects it will have.

**T**he global move towards an information-based economy is in full swing. The new internet economy is attracting the attention of business leaders, educators and politicians worldwide, and companies like Amazon.com, eBay and eTrade are successfully rewriting the rules of consumer purchasing.

**Intel is selling products** worth \$1bn over its web site each month and Cisco sells \$500m-worth of routers a month. E-commerce companies have come from nowhere to become powerhouses. Some are being valued at billions of dollars after less than 18 months in business. We are on the verge of a new economic model which will redefine how we buy and sell in the next century. And just as important are the trends that will affect the way we work, learn and play.

Amazon.com has defined how net purchasing of products works and is on track to become the WalMart (a US mass-retailer) of cyberspace: it will eventually be a worldwide supermarket. Walmart will itself become a serious player. CDNOW.com and MusicBlvd.com are pioneering music sales; Beyond.com and Egghead.com are helping to do the same for software. In time, online purchases could account for as much as 50 percent of all consumer goods sold, according to bullish internet analysts. Of course, selling products over the web is not just a consumer phenomenon. Boeing will soon sell airplane parts from its web site.

All this will have many side effects. Today, a sales person calls on a company to show off his wares, but in the future those wares could be demonstrated via a two-way, web-based, real-time presentation and the sale completed online. So the role of the salesman could dramatically change to that of a "customer relationship representative". There will still be sales calls in the standard sense, but the reason for the personal visit will be to enhance

the business relationship while the selling will be done online, in some cases automatically.

**Businesses of all kinds** will begin to run their entire operations over the internet, which will have an incredible impact on the future workforce. Over time, the wired workforce will have more information on its hands than ever imagined. It will allow them to create virtual workforces — something that will forever alter the dynamics of business. Workers will be empowered by the information at their fingertips and will use it to enhance their business skills, but learning will be lifelong. In the past, people were trained to handle one skill for their entire life. In the new internet economy they may need to acquire as many as five to ten different

skills in their working life. Companies will grasp the fact that their real assets are their employees. But of course, this creates a whole new problem since their assets walk out the door each night at 5pm. Smart companies will figure out how to keep them loyal via programmes that keep morale high and turnover low.

The lifelong learning model is the key to the future of any education system, too. Today, most schools teach by giving children information. In the future, the emphasis will need to be on the learning process itself. Children will use the internet to gather information as well as to develop worldwide virtual learning enclaves. Distance learning and collaborative learning will change the educational scene forever.

*All this will have many side effects*

**There's one other trend** that

will be in full swing in 1999. We are seeing the "deconstruction" of the PC. Today, a PC is defined as either a box that sits on your desktop or a portable you take on the road. These are both excellent internet access tools, but we are soon going to see set-top boxes, web phones and web TVs as well as portable web pads (left) — tablets that give users wireless access to the internet just about anytime, anywhere. This trend will push the new internet economy at lightning speeds beyond business and into the hands of mainstream users, and will help usher in this new e-commerce model sooner rather than later.

These moves all point to the fact that the internet economy is the most important thing on which any business leader, government official or educational administrator needs

to get a firm grip in order to prepare their own staff, constituents and students to take advantage of this major economic shift.



◀ **DECONSTRUCTING THE PC: A PROTOTYPE WEBPAD FROM CYRIX USING ITS MEDIAGX CHIP. (PICTURED AT COMDEX USING THE KODAK DC210 DIGITAL CAMERA. SEE P26.)**



## Community spirit

The growth of **online communities** is attracting e-commerce. Susan Pederson reports.

**G**roucho Marx once famously claimed that he wouldn't want to join any club that would have somebody like him as a member. Nevertheless, people are ignoring his advice in droves and flocking to become members of a new kind of club that will take virtually anybody as a member. These are the online communities. For as long as networks have existed, people have used them to

communicate with other likeminded people. After all, that is why they were designed.

In their earliest incarnation they were created and used by scientists and universities to trade information and keep up to date on the latest research in their field. These networks gradually expanded to include people from the larger population who developed proto-online communities such as CIX in the UK, and Usenet.

Newsgroups dealing with every topic under the sun sprang up almost overnight and soon it became possible to find someone — and in many cases, hundreds or thousands of people — who wanted to discuss computer problems, fly fishing or the latest episode of Coronation Street.

**It soon became evident**, however, that people were not just using these networks for practical purposes. Instead of simply finding an answer to their problem, library-style, and then getting back to their regular lives, they were staying online. And so the concept of the online community was born. Today, the most famous of these early online communities is probably The Well, a computer conference system which sprang up in California during the mid-eighties. Even now, it's still considered the height of cool to have an email address ending in @well.com.

With the development of the world wide web, online communities began to



▲ **DISCOVER THE GASTRONOMIC DELIGHTS OF LITTLE ITALY WITHIN THE ELECTRONIC WALLS OF FORTUNE CITY**

also provide possibly the biggest single marketing opportunity, ever. Companies can spend millions of

move away from the bland, text-based interfaces of newsgroups and computer conferences towards HTML pages. New communities sprang up, most offering web space to users in return for plugging advertisers' wares.

Geocities, one of the most well-known web communities, has created 41 themed neighbourhoods which are populated by almost three million "homesteaders". Altogether it claims to have hosted 22 million web pages. This is an astonishing amount of content, particularly when you consider that it sprung up with only a little encouragement.

Fortune City, Europe's largest virtual community, is organised along much the same lines as Geocities. There, you'll find neighbourhoods organised by subject matter, such as Benny Hills (the comedy district) and Wembley (the football district). Users get 20Mb of free web space, which is paid for by a floating ad window attached to their pages.

Fortune City describes itself as "the only true democratic community in cyberspace", saying that it offers an environment where citizens (or so-called "netizens") can develop relationships, build homes and have a direct impact on the development of their community. But Fortune City is not shy about the fact that it wants to pull businesses into the community, as well.

**Online communities** may provide a valuable support network in an increasingly fragmented society, but they

pounds trying to find out who are their potential customers, yet by targeting specific online neighbourhoods they greatly simplify the task.

Tripod, which recently established a UK community site, is also hoping to attract advertisers to its site as well as turn its citizens into advertisers themselves. Tripod offers 12Mb of web space and a web-page builder, and claims to have three million eager homesteaders. E-commerce sites such as bookseller Amazon are also getting in on the act by providing chat areas for customers to communicate with each other, and communities are also likely to become a big part of portal sites such as AltaVista, Yahoo! and Netscape's Netcenter.

These communities are a potential goldmine but they'll have to tread carefully to avoid alienating their citizens. Geocities was recently blasted by the US Federal Trade Commission for selling-on its clients' personal details to direct marketers.

As online communities continue to grow, the advertisers are sure to follow. But with any luck, "pure" online communities, such as The Well, will continue to thrive as an alternative to advertisement-based services. As geographical barriers collapse, it's almost certain that one day it will be as common to stake out a virtual real-estate claim in cyberspace as it is here on Earth. ■

## short stories

### ▶▶▶ STREAMLESS WHISPER

A technology that transmits sound over the internet without streaming has been unveiled. The software, called hyperceive, delivers internet audio almost instantly by breaking the sound down into its separate components and then caching and relinking it. Unlike other internet audio products, users don't need a separate plug-in. You can see hyperceive (priced £152 inc VAT) in action at George Michael's site, [www.aegean.net/greatesthits](http://www.aegean.net/greatesthits). [www.insigma.com](http://www.insigma.com)

### ▶▶▶ DID I SEE YOU AT ICQ?

AOL says that a new version of ICQ, the free internet chat software that it acquired last year, is on the way. ICQ99 is expected to have more portal-style features, such as web-search capability. This feature is already available from AOL's own messaging product, AOL Instant Messenger. ICQ has over 21 million users worldwide.

### ▶▶▶ EXPRESS SERVICE

A new high-speed wireless data communications company has launched its internet and intranet service in the Thames Valley. Tele2 UK's Advanced Digital Wireless Network hopes to provide businesses and homeworkers with permanent speed without the high costs of a leased line. A phased national rollout of the service is planned for this year. Tele2 is offering line speeds of 128, 256 and 384Kbps, but it says that speeds of up to 2Mbps will also soon be available. Prices start at £65 per month for a 128Kbps connection, with a £290 installation charge. The service also offers permanent connectivity, but users only pay for the time they are actually transferring data.

[www.tele2.co.uk](http://www.tele2.co.uk)  
0800 328 7222

## E-COMMERCE

# EC to regulate e-commerce

The European Commission (EC) has adopted draft legislation to **regulate the exploding e-commerce market**. The proposed legislation, which covers the sale of products and services via the web, as well as advertising, direct marketing and online newspapers, essentially puts the burden of responsibility on national consumer laws in each member state.

However, certain areas would be standardised across the 15-country community — namely, giving the location and business of a company via its fixed location. This would make online contracts as legally valid as paper ones.

Intermediaries who transmit and store data will be exempt from liability if their role is a passive one in simply transporting information.

The EC plans to give each individual country control over internet businesses operating out of its territories. This is a hugely contentious point, and one that is likely to cause clashes. Consumer organisations want the legal system in the country where the consumer is living to deal with any cases that arise. However, e-commerce business groups want complaints dealt with in the country in which the e-commerce company is based. The EC said that

regulation is necessary to increase Europe's slice of the e-commerce market, which is heavily dominated by the US, by increasing customer confidence and giving operators legal certainty. The EC estimates e-commerce could be worth \$240bn by 2000, when the number of people connected to the net will rocket from the current estimated 86m to 250m.

Nothing, however, is yet written in stone. The proposals will have to be approved by the Council of Ministers before becoming law. In this process they could face substantial amendment by the European Parliament.

JAN HOWELLS

# BT pushes PointCast

The most well-known "push" internet news broadcaster has launched a UK version of its service. The PointCast Network delivers the latest news, weather and stock-quote information to the desktop via selected channels. The UK edition, which launched in December, will take its content base from ITN,



the Press Association, *The Economist* and Reuters. BT, which is a major sponsor

of the free service, is collaborating on other channels such as industries, companies, sport and lifestyle. PointCast Network UK is now available for download from [www.pointcast.co.uk](http://www.pointcast.co.uk) or from [www.btinternet.co.uk](http://www.btinternet.co.uk).

The service is also included on BT Internet CD-ROMs.

## Win a wand at wizard web site

The Merlin Mystery is a book that gives readers the chance to win a prize of over £100,000 — if they can solve the puzzle it poses. A web site has been set up to let readers swap clues and track the prize fund, which also includes a gold, bejewelled wand.

[www.merlinmystery.com](http://www.merlinmystery.com)



## Top 10 products Last month

### Peripherals

1	3Com 56K V90 Voice/Fax Ext	3COM	1
2	P75 To P200MMX	Evergreen	4
3	Billion Internal BT only	Euro Serv	-
4	Sound Blaster PC128 PCI	Creative	-
5	SoundBlaster Live PCI	Creative	7
6	Sidewinder Freestyle Pro	Microsoft	-
7	Astra 1220S Flatbed	Umax	-
8	56K Message Modemex	3COM	-
9	Typhoon Gold Wave 3D ISA	Typhoon	-
10	Natural Keyboard+ECU sym.	Microsoft	-

### Windows software

1	Centennial 2000 Pro Net	Centennial	-
2	Encarta Reference Suite 99	Microsoft	1
3	Windows 98 U/G CD	Microsoft	4
4	Office Pro 97+Books U/G	Microsoft	3
5	Norton Systemworks v1	Symantec	6
6	Masterclips 150,000 Clip Art	IMSI	2
7	Works Suite 99	Microsoft	-
8	Partition Magic 4.0	POW	9
9	Money 99	Microsoft	-
10	Via Voice 98 Executive Edition	IBM	-

### DOS software

1	Turbo Pascal v7 DOS Educ.	Borland	3
2	PKZip for DOS	Nico Mak	-
3	Turbo Pascal v7	Borland	1
4	Mail PC Remote 3.2	Microsoft	-
5	DOS v6.22 U/G	Microsoft	4
6	PC Anywhere v5 Host	Symantec	-
7	Novell 3.25	Novell	-
8	Star Trek: A Final Unity	Spectrum	-
9	FSFX U/G for MS Flight Sim.	Microsoft	4
10	Norton Commanderv5	Symantec	2

### CD-ROMs

1	South Park Desktop Themes	Telstar	-
2	Simpsons Virtual Springfield	Fox Int.	-
3	Star Wars: Behind The Magic	Lucas Arts	1
4	Simpsons Cartoon Studio	Fox Int.	-
5	Dancing Baby Screensaver	Jellyfish	-
6	James Bond Ultimate Dossier	Eidos	-
7	Dancing Baby CD Player	Jellyfish	-
8	Lego Creator	Lego Media	-
9	Top Of The Pops Mix Factory	BBC	-
10	Dance eJay	Fast Trak	7

### Games

1	Tomb Raider 3	Eidos	-
2	Half Life	Sierra	-
3	South Park	Acclaim	-
4	Settlers 3	Bluebyte	-
5	Populous: The Beginning	Bullfrog	-
6	Simpsons: Virtual Springfield	Fox Int.	-
7	Wargasm	DID games	-
8	Anno 1602	Max Design	-
9	Combat Flight Simulator	Microsoft	-
10	Trespasser: The Lost World	Dreamworks	-

Games and CD-ROM figures supplied by HMV. Others from Software Warehouse.

## GAMES NEWS

# The new Populous has the personal touch



▲ THE SHAMAN, FROM POPULOUS: THE BEGINNING, CASTING A POWERFUL SPELL KNOWN AS 'GIVE OUR ENEMIES A NASTY LIMP'

For all those who enjoyed Populous, the sequel is on its way. Bullfrog's **Populous: The Beginning** makes the game more personal, strategic and tactical. You play a Shaman, the leader of a tribe battling your rivals to gain the ultimate prize of divinity. Your tribes build settlements and are prepared to fight and die for their goals. You must survive through each new world and fight to acquire the power of magic and the wisdom of the Gods. For more on this intriguing game, look out for a review in *Screenplay* soon.

More sequel news. TOCA Touring Cars was so successful that **TOCA 2** was inevitable. Soon available for the PC, this game recreates the most exciting, aggressive, closely fought racing tournament of the 1997 British Touring Car Championship season. Players will have the chance to get behind the wheel of a Peugeot 406, Renault Laguna or Audi A4 and take them up to speeds of 147mph. At an estimated price of £12.99, you're really on the right road.

Do you dream of designing an amusement park? Hasbro Interactive is releasing a game where you can do just that. **Rollercoaster Tycoon** is a fully featured amusement-park simulation that concentrates heavily on the fascinating and complex skill of rollercoaster design. The player can also build non-rollercoaster rides, shops and stalls and open their park to virtual visitors. The challenge,

therefore, is not only to invent an amusement park which is sufficiently fun to keep visitors coming back, but which is also profitable. Rollercoaster Tycoon will be out at the end of March.

Games publisher SCI is involved in a legal battle with the British film censors over the age rating for its latest offering, **Carmageddon II**. The game is currently featuring zombie "pedestrians", but if you find them rather tame targets and would prefer to run over innocent members of the public, visit the SCI web site at [www.sci.co.uk](http://www.sci.co.uk) where you can get hold of all the necessary upgrade files.

Eidos has launched a range of merchandise that flaunts the charms of Tomb Raider totty, **Lara Croft**. The clothing range, called LARA, comprises men and women's T-shirts, polo and sweat shirts, a fleece, a jacket, dressing gown, baseball cap and knitted ski hat. There are also accessories such as a briefcase bag, mini-rucksack, bath towel, wallet and watch. To order, call 01525 381808 or visit the web site at [www.eidos.co.uk/larac/](http://www.eidos.co.uk/larac/).

ETELKA CLARK

Games in Screenplay this month (p312): Pinball Arcade, Hedz, Speed Busters, Small Soldiers: Squad Commander, 101: Airborne Invasion of Normandy, and FA Premier Football Manager.

Michael Hewitt looks forward to **buying a talking fridge** to sort out his food and his love life. Cool!

# Cabinet talks



I'll be moving house in a couple of months. My current set of domestic appliances, however, probably won't be. Whenever I've tried transporting them in the past, most have developed some niggling fault within weeks of being installed in their

new location — they were probably pining for their old home, like many transplanted cats and dogs are wont to do. This means I'll be in the market for some new white goods: a fridge, for instance.

**I had been planning** on buying one of those massive American cabinet refrigerators. You know, the sort whose spare chiller compartment you can rent out as a bedsit to visiting Eskimos. But a story entitled "The Fridge with a Brain" in one of the Sunday papers caught my eye the other week. Apparently, a company called MediaCentre which is based in Friedrichshafen, Germany, has invented an artificial intelligence fridge which, when it goes on sale later this year, will be far cleverer than the artificial retard variety, yet will only cost about 30 percent more. It could be worth investigating.

On a basic level, the thing can hazard an educated guess as to whether or not your food bears you any potential ill will. It does this by reading the bar codes on all goods entering and leaving. So, for instance, if you attempt to take a swig from that milk carton you bought last June, an electronic voice will pipe up: "Trust me, you really don't want to do that". Likewise, senescent eggs can be outed before they cause any distress to visiting curates. And, using those same bar codes, the fridge will perform elementary stocktaking functions, advising you that you're running low on certain items, or that maybe you're overdoing it on others, such as the 24-packs of Tennent's Super.

**The intelligent fridge** really shows its mettle, though, where these artificial intelligence functions are allied to comms technology. If you link it to the internet and thence to one of the newly emerging breed of online supermarkets, like Tesco, you can have it automatically order replacement items as and when they run low. Or, if you have a penchant for certain hard-to-get, seasonal foods, the fridge will email your predilections to the store, which will then email back if and when the food is ever in stock.

Menu-planning also becomes easier. Let's say you're in Waitrose, sourcing the constituent elements of a Delia Smith-inspired opus. Do you already have what you need at home, or do you need to buy more? MediaCentre spokesman, Markus Wilks, explains: "You could use your mobile phone to call your fridge from the supermarket and ask it whether it has the ingredients available for the recipe you have in mind." This would be pretty impressive for a PC, but for a fridge, it is really going some. Inevitably, I suppose, you'll get the occasional, "Sorry, I can't talk at the moment — I'm defrosting", but that's a small price to pay for the ability to have an intelligent two-way conversation with a kitchen appliance.

**Even more impressive**, however, is the way in which this refrigerator can help spice up your love life. Markus Wilks, again: "You come home from work and the fridge will suggest a quick recipe for one person, if you're in a rush, or perhaps something more romantic if you are planning to entertain." And maybe some form of relationship counselling, too, if your cookery doesn't come up to expectations. Not that this is likely. If the

**So, for instance, if you attempt to TAKE A SWIG FROM THAT MILK CARTON YOU BOUGHT LAST JUNE, an electronic voice will pipe up, "Trust me, you really don't want to do that"**

refrigerator has been properly monitoring the hit rate of your candelabra-lit romantic encounters, it should have built up some sort of picture of your culinary (and amatory) limitations. So, if it thinks you really are the sort who is able to burn water at the drop of a saucepan, its door will remain resolutely shut should you attempt anything more complicated than a romantic beans on toast for two.

All technology has its downside, though, especially the cutting-edge stuff. As more people buy these high-tech refrigerators and get onto the internet, they will start to communicate not just with you and with supermarkets but with each other as well. And very soon, no doubt, as other kitchen appliances are endowed with the same sort of intelligence, with them, too.

Mike.hewitt@mjh1.demon.co.uk

Barry Fox spreads his wings for a VR flight across the Dome but **hits trouble** with the techies.

# Virtually pointless



Some time ago I wrote about English Heritage teaming up with Intel to put a virtual reality replica of Stonehenge on the internet. At its grand launch at the Planetarium we took a virtual ride through the stone circles. The ride was

smooth because the images were being sourced from the hard disk of a high-spec workstation. Accessing the site with a PC involved downloading the VR Viscap software from Superscape and persuading it to work. Superscape admitted problems, as did the English Heritage IT department.

**I wasted hours** getting it up and running. Then, last October, Intel teamed up with the New Millennium Experience Company (NMEC) to try and boost the Dome's tattered image with a VR flypast. Hoping for a smoother ride than at Stonehenge, I logged on to the Dome site <[www.intel.com/intel/showcase/guide/sites/dome2000.htm](http://www.intel.com/intel/showcase/guide/sites/dome2000.htm)> or <[www.dome2000.co.uk](http://www.dome2000.co.uk)>, following all instructions to the letter. It took 30 minutes to download Viscap's software but finally I was all set to "enjoy the ride". But all that came up on the screen was the message "Superscape Error, Configuration File viso.svr invalid".

I faxed Intel and the NMEC, itemising the problem. I heard nothing from the NMEC but Intel got Superscape to call. It was Stonehenge *déjà vu*. "Oh yes," said Superscape's techie when I recited the error message. "We've got it, too. We're in the process of setting up a support site to tell people what to do." One week later, there was no trace of any support message. The trick is to delete all the PC's temporary files and cached web pages — tough luck if you wanted to keep them.

**After some prodding**, the NMEC Press Office stated: "We've not received any negative feedback [on the Dome site] from our users" — except mine, of course, which had conveniently gone missing. "*Has the NMEC ever tried accessing the site and downloading the software?*" I asked. (The Superscape techie had admitted he hadn't tried a live download.) "Of course," said the NMEC spokesperson just a little too glibly to give me confidence. "*What's your office system?*" I enquired. "How would I know?" quipped Ms NMEC. "*Well, can I speak with whoever set up the system?*" "No," replied the spokesperson "but I'll relay your questions." So I recited the error message.

Back came a gloriously off-the-point email: "Configuration problems occur when you don't allocate the correct operating system or navigator — in reality there are about five different options, in terms of the download. A problem can arise if you don't choose the exact one. After downloading Viscap the entire system should be closed down and the PC rebooted. Go back to the site at [www.dome2000.co.uk](http://www.dome2000.co.uk) and go to the 3D Dome. Everything should then run smoothly. While we're happy to provide you with as much information as you desire, we cannot provide direct support to you from our IT department." I had by then made the system work and taken a pointless ride over the empty egg structure.

My dialogue with the Millennium exhibition organisers has made me even more curious about what they'll be putting inside the Dome, and whether it will be worth a visit. I still have vivid memories of visiting a

## I had by then made the system work AND TAKEN A COMPLETELY POINTLESS RIDE over the empty egg structure

high-tech Expo in Japan — the British Pavilion was exhibiting a collection of tea bags.

■ **While CompuServe's md**, Martin Turner, protested that his service didn't make it easy for crooks to scam banking details from new users, I was signing up to CompuServe as a new user, under a pen name. Within hours I got a dodgy email from someone called "russian sexy". Then came two "Urgent Messages" from different sources, each signed off as "CompuServe Account Manager, John Debrí" and titled "Problem with Your Account".

Both messages asked for my password, address and credit card details. The scam emails were addressed to the new trap account by number, not name. Clearly, the scammers were targetting my *new* address number. I called CompuServe's Help Line and asked about John Debrí. "We already know about him. Delete the message and don't reply," they said. "There are a lot of hackers out there trying to get members' details."

Perhaps Martin Turner could try setting up a new account and calling his own Help Line?

100131.201@compuserve.com

If you're in IT and haven't **made any plans** for the coming year, Brian Clegg has a few suggestions.

# Nice and easy does IT



As this is the February issue and I'm writing in November, it must be the month of January. Time, then, for all IT managers and directors to pull on their thermals and jot down a few resolutions for 1999.

Here's the Business Matters guide to what all good business IT people should be seriously thinking about this year.

**Firstly, learn to love the year 2000.** There's less than 12 months to go, now. We spent last year panicking, so now let's take a different approach. After all, the IT director of a large firm recently moved to the role of "Director of Year 2000 Systems" so that he could "slow down a little" — he has obviously realised that it doesn't need to be stressful. I'm not saying that the millennium bug won't cause problems, just that most businesses will find it less cataclysmic than the prophets of doom are predicting. You would be stupid if you didn't make sure your key systems won't fall over as you slurp your NV champagne. But don't lose too much sleep. Bear in mind that the past few years have seen companies reducing the importance of the IT department. What better than a plague of irritations to make their saviour (that'll be you) appear more valuable? Consider taking a week's holiday across the New Year, proving your immense confidence and making sure you miss out on all the phone calls that will be inevitable for the first couple of days.

**Secondly, don't fret about the euro.** So what if you can't print a cross between the letter "e" and a cent symbol (by the way, what is one-hundredth of a euro called? I've never heard it mentioned)? Just use an "e" until you get a new font. If you handle foreign currencies, you should be able to handle the exchange rates. If you don't, it's a matter of supreme indifference. Let those excitable foreigners worry about it — you need to watch your blood pressure.

**Thirdly, grab the world wide web** by the scruff of the neck. Up until now, you've dabbled. You've put up a pretty, corporate site probably designed by the people who produce your annual report and accounts. It's

glossy, it has pretty pictures, it looks wonderfully professional and... it's exquisitely boring. What to do then? Get it remodelled by an arty-farty designer who thinks he's got a sense of humour? Nope, you are missing the point. The web is not a corporate monolith, it's about diversity. Instead, give each of your employees 5Mb to do something for the company. Provide them with the sort of facilities that Amazon.com gives its associates, so your staff can link their sites into your products, services and information, just as an Amazon Associate links into books on the Amazon site. Sit back and be amazed. Of course, some of it won't be very professional, and they'll probably use your corporate logo in the wrong colours. But so what? Those are measures of the old world; the web is a different place.

**Finally, introduce a new business model.**

Once upon a time, the IT department was a bunch of hotshot engineers. Then you lot became despots, ruling over data with iron fists. After a while this became irritating, especially to the people who paid for the IT

**The IT director of a large firm recently moved to the role of Director of Year 2000 Systems SO THAT HE COULD SLOW DOWN A LITTLE — he has obviously realised that it doesn't need to be stressful**

department, so you became partners, working together with business managers towards a common goal. Briefly you were entrepreneurs, selling the joys of personal computing. Most recently you have been governesses, servants who are scared of dismissal (outsourcing) but still feel that you have to tell the children what to do. Now it's time for you to be broadcasters.

Set IT users free to do things in the way they want, but provide backbone services they can tune into by choice. Let a department run its own payroll system, but make it so easy and attractive to plug in to your central service that they won't want to. It's time to let your "customers" grow up. That should be enough for any IT manager, but to pull it all together (and this resolution applies equally to IT vendors) remember that IT is only there to supplement people. Make sure your IT works for what *they* need, not the other way around.

Brian@cul.co.uk

Paul Smith isn't paranoid. He knows that **someone is watching** his every move on the net.

# Keeping a low profile



I think I may have stumbled on a global conspiracy of such devastating importance that it threatens the whole new communications system and, by extension, civilisation as we know it. Either that, or I'm exaggerating a bit. Still, I'll tell

you what's going on and you can decide whether this is some savvy yet fun little innocence or some Mandelsonian plot to subvert basic human rights.

**I've been editing** a web site recently that I forbid you to visit except under certain, specific conditions. It is called Jamba <[www.jamba.co.uk](http://www.jamba.co.uk)> and so that no-one mistakes me for a cabinet minister, I shall reveal my interests here — I have none, save for a straight day-rate freelance fee. So, I have no motivation but the concerns of the reader when I say that you may *not* visit this site during working hours, except lunchtime and after work. The site, devoted as it is to fun, games and various prizes, is of a decidedly distracting lilt and its use can in no way be justified to one's employers. And there's no (anti-) "Boss" key. For those too young to know, the Boss key (Alt+Tab) was a feature of older games that allowed you to bring up a mock spreadsheet on your screen if your boss walked by.

Anyway, while working on this site I uncovered a dastardly plot. It turns out that the site uses a system, provided by Engage, to track you wherever you go on the web. In a recent press release, Paul Schaut, CEO and president of Engage Technologies, explains it like this: "By leveraging visitor profiling to drive dynamic content decisions, we are raising to new heights the level of visitor interaction available today." The press release, filled as it is with Random Capitalisations For Added Import, goes about those joining "a growing list of industry leaders embracing Engage precision profile-enabled online marketing solutions by becoming a member of its Precision Partner Program — A New Way of Looking at the World!"

**Now, I have no idea** what any of that means. I don't know what it is about Americans in general and policeman in particular that makes them feel that by using long words, nouns instead of verbs and the passive voice, authority will be added to their statements. I recall an accident investigator looking into the Air India

disaster describing why an exploding bomb had caused the plane to crash. The reason, it turned out, was that the detonation "compromised the structural integrity of the aircraft". As in "it fell apart", right? So, when the CEO (*and* president) of Engage, The Man With Much To Schaut About, says "[twaddle twaddle twaddle]", what I now know he means is that he's building up a global web-wide system that tracks everywhere you've been and every site you go to. Then, when you visit any "Precision Platform Program Member Site" (PPPMS) you will, via "anonymous visitor profiling" combined with "dynamic content management", get advertisements tailored to your very specific interests.

**Let's set aside** the fundamental moral issues of integrity, propriety and privacy for now (because they're just so darned tricky) and look at some of the more simplistic ones. I can imagine how this service can cause all sorts of problems. It is based on cookies, those tasty little morsels crumbled all over your hard disk. What happens is that the first time you visit a PPPMS you get a cookie. Thereafter, every PPPMS you visit logs your passing. A profile is built up in some anonymous server

**While working on this site I UNCOVERED A DASTARDLY PLOT. It turns out that the site uses a system to track you wherever you go on the web**

owned by a shady Middle Eastern concern and buried under a mountain near Wichita, in the United States. Actually, I just made that bit up. But a profile is built which any PPPMS can access, revealing your specific "interests".

Imagine then, that you're showing off some new site — in your lunch break, of course — and up pops a whole series of "tailored" banners, revealing those "interests" to all who sit at your desk. All of a sudden your carefully honed image around the office is in tatters, as your shocked colleagues watch aghast at the succession of banners entreating them to enjoy the "Literary Evening this Wednesday at [www.fineclaret.com](http://www.fineclaret.com)" or to sample the latest releases from [www.cyndilauper.com](http://www.cyndilauper.com). Where is "Bouncy Bertha's Big Bad Titty Bar" banner when you need it most?

[www.paulsmith.com](http://www.paulsmith.com)

# letters

Send your letters to >

The Editor  
Personal Computer World  
VNU House  
32-34 Broadwick Street  
London W1A 2HG

or email > [letters@pcw.co.uk](mailto:letters@pcw.co.uk)

or fax > 0171 316 9313

## Win a Taxan monitor

Each month we are offering a 17in Taxan Ergovision 750 TCO95 monitor to the winner of the Letter of the Month.

For the complete range of Taxan monitors, call 01344 484646 or visit the web site at [www.taxan.co.uk](http://www.taxan.co.uk)



**TAXAN**<sup>TM</sup>  
TOKYO, JAPAN  
You won't regret it.

## THE BROAD PICTURE

With the rash of new machines featuring DVD drives, isn't it about time people in the industry started developing widescreen monitors? There are cards for outputting the Dolby 5.1 sound system but no monitors to see the full picture. Of course, movies aren't a particularly good reason for businesses to buy widescreen monitors, but how about the productivity gains of being able to see two sheets of A4 side-by-side: perhaps a copy of Netscape on one side, while writing a report in Word on the other?

ASHLEY SEARLE  
[asearle@colt-telecom.com](mailto:asearle@colt-telecom.com)

**PCW replies >** Good news, Ashley. Every time we speak with panel and CRT manufacturers they talk confidently of releasing widescreen displays in the near future, and several previews turn up at various trade shows. In the meantime, Sony's W900 is a 24in widescreen CRT PC monitor, although with a somewhat curious 16:10 aspect ratio.

## LETTER OF THE MONTH

### SAFE FROM THE CYBERNAUTS

Humans and computers will become more integrated in the future, but unlike Professor Warwick (PCW Dec '98) I do not believe we are in danger of being replaced by super-intelligent machines. The problem with writing a program for AI is that it cannot be done. Any program is ultimately a series of rules which states the output for a given input. Unfortunately for Professor Warwick, Gödel proved that any formal system has "holes" in it. My personal belief is that the neural net in our heads gains its power not just from its scale but from the fact that, ultimately, whether a neuron fires is determined by a single electron, which is itself determined by quantum probability. I cannot see how we can successfully model in real time the inherent randomness at the core of our intelligence. It is this chaos at our core that enables those intuitive leaps we call intelligence. But that doesn't mean we shouldn't try. Who knows what insights we may gain?

DAVID BASIL WILDGOOSE  
[dbwildgoose@dial.pipex.com](mailto:dbwildgoose@dial.pipex.com)

**Prof. Kevin Warwick replies >** Machine intelligence and human intelligence exhibit, for the most part, many different characteristics. The hardware employed to implement each intelligence along with how it interacts with the world is not the same, even when a machine design is based on a model of the human version. There are, as your letter points out, numerous approaches to categorising and formulating the different modes of operation, quantum effects being a popular modern theory, but we should be careful what conclusions we draw because of the differences in intelligence. The fact that humans cannot successfully model a particular feature of our own intelligence is an interesting observation, but it does not provide a limit to possible machine intelligence other than to indicate that it is difficult for humans to imagine a form which is the same as our own. I do not feel that there is an inherent randomness or chaos in human intelligence. Can anyone truly do anything that is, to them, random? Further, when given the opportunity, due to their potentially more powerful physical capabilities, I see no reason why machines cannot be far more intuitive, creative and intelligent than humans!

## THE BBC MICRO AND A FORESIGHT SAGA

Since when did the government choose between the PC and the BBC machine (Business Matters, PCW Jan '99)? In the early eighties, the only computers suitable for educational use were the Newbrain, Apple II, Sinclair Spectrum, and the BBC. I remember that the Apple II (not the Mac, which didn't appear until 1984) lost out to the BBC machine in many schools because of price. But the real reason it was chosen above its competitors was because of its in-built programming language, BBC Basic, which allowed many children to become skilled programmers. Today, computers are just applications machines and this is why Acorn's later systems failed to thrive. To suggest that the government of the day should have had the foresight to back the winning horse, when half the horses hadn't even been called, is fatuous. Perhaps Mr Clegg could tell us what semiconductor firms will be the market leaders 15 years hence? For a man with his obvious foresight, it should be easy.

ALEX PINKERTON  
[alpink@globalnet.co.uk](mailto:alpink@globalnet.co.uk)

**Brian Clegg replies >** Alex's chronology is wonky. I believe the BBC-B appeared in 1982, a year after the IBM PC. He's right about the date for the Apple Mac (I noted this in the article) but misses the point. The US already had educational computers but made a switch to something more appropriate. I'm not sure why he suggests that today's computers are "just applications machines" or why having an application should be a bad thing, but it's strange that Alex thinks the government needed to be psychic to back the right technology. By the mid-eighties, most businesses had got it right without the aid of Mystic Meg.



## GOING GUI ABOUT ROM

Regarding the continuing discussion about putting Windows onto a ROM (*Letters*, Dec '98 and Jan '99), cast your mind back a couple of years, to the Atari Falcon — a 32-bit computer with a 32-bit operating system, multitasking, customisable desktop and true-colour to boot. This operating system would boot up from ROM even if no hard disk or floppy drive were connected.

I am also pretty sure that the ROM took up only about 1Mb or so. I thought the appearance of the operating system, Multi-TOS, was nicer than Windows and faster, too. All the drivers needed by software were usually kept on a hard disk and were loaded only when a program called for them. So there you go: proof that a good Graphical User Interface can be held on ROM.

SAM LUNT

[colin@luntcp.globalnet.co.uk](mailto:colin@luntcp.globalnet.co.uk)

## THE BBC MICRO WAS AN EARLY LEARNING CENTRE



I'm one of those people you're expecting to tear lumps out of you for slagging off the BBC (Brian Clegg's *Business Matters*, PCW Jan '99). "When you see how five-year-olds can use a Windows PC..." you say. Well, I believe you are wrong to compare facility of use in the BBC Micro with that of a PC. Different skills are required to use an application than those required to write one. The BBC was probably the last computer that a pupil could actually comprehend in its entirety, largely due to an elegant design and a comprehensive, clear User Guide. Am I wrong in thinking that it is far better to learn how to understand the workings of a computer than to learn to use Microsoft Works? In my book, veneer is no match for totality.

CONOR MCQUAID  
[gonad@enterprise.net](mailto:gonad@enterprise.net)

**Brian Clegg replies >** *I was not really slagging off the BBC machine — I did call it "sophisticated"! When I started programming in the late seventies they tried to explain to me how the computer, a Dec System 10, worked. I'm afraid I did not care, any more than I needed to know how a ballpoint pen works in order to be able to write a good story. It was what the computer could do that was wonderful, not how it did it. I cannot imagine many five-year-olds were programming BBCs. Weren't they using "educational software"? For older children, I believe something like Visual Basic can be made just as approachable and produce far more impressive results. Usability and quality of interface account for a lot more than just veneer.*

## STEADY ON ROM

Your reply to Stephen Fusi's letter about putting operating systems on ROM (*Letters*, Jan '99) inferred that PCs could not possibly benefit from technology already used in "toys" such as consoles. Not so. If people buy console games on 32Mb cartridges, that is more than enough to store NT's kernel. Subsidiary files such as swap files would have to be re-initialised but load times would still be much quicker. Once loaded, no PC OS uses anywhere near 32Mb, otherwise most users would have no RAM left to run anything else. If you had a flash-ROM PC the first thing you may see on powering up could be the NT logon screen. Quite a time saving? The main issue, though, is not load time but stability. When NT and 98 crash they can often take down the Start bar, leaving you in limbo. But if the Start menu and kernel were in hardware and were accessible the instant you pressed the Start button on the keyboard, then at least you could properly deal with the crashing application. At present, the Start and Control menus are affected far too much by program activity — even loading a large file, or network browsing, can render the interface inaccessible. One day, people will no doubt crash space shuttles into space stations while they feverishly press CTRL-ALT-DEL!

WILL HODGKINSON

[will@vli.co.uk](mailto:will@vli.co.uk)

**Andrew Ward replies >** *Embedding Windows in ROM has always been possible and can even be done with Windows NT in as little as 10Mb using Component Integrator from VenturCom. But this is intended for such things as embedded control systems and is unlikely to be useful as a desktop platform; since so much is stripped out, it's not relevant to general-purpose PCs today, as we know them. However, there is another ROM-based operating system from Microsoft, Windows CE, which is gradually creeping up the complexity scale and now, with DirectX support, is likely to emerge into the games console/set-top box/PC convergence market and perhaps even replace Windows 98 on entry-level desktop systems. This may become the route through which we see the benefits of ROM-based operation on the desktop.*

## EURO DIS-HARMONY

James Taylor, the writer of your article about the euro ("European horizon", PCW Jan '99) immediately loses credibility by pronouncing that EMU stands for "European Monetary Union". It doesn't, despite popular belief to this effect. It



means "Economic and Monetary Union". He loses still more credibility by lumping together such firms as Philips, IBM, Siemens and Rover as if they project a single face about how they intend to handle the euro.

I recently attended an IBM seminar at the company's South Bank premises and it was quite plain that it will deal in whichever currency its customers and suppliers

choose. So while it may be strictly true to say, as James Taylor states, that these companies will "start to use the euro for invoices and payments", it's a very different "start" between the various members of the group he mentions.

STEPHEN MUIR

[stephen@task.force9.co.uk](mailto:stephen@task.force9.co.uk)

**James Taylor replies >** *It was not intended to be that sophisticated, Stephen. Those firms were identified simply because they're among the better-known proponents, not to represent any kind of grouping apart from their shared intention to embrace the euro sooner rather than later. Nor was it intended to suggest a mutual approach or agenda. Indeed, their only other common ground is that as multi-national corporations they might be expected to be just as enthusiastic about EMU with the dollar.*

*Regarding your first point, you are absolutely right, although I plead that using "European Monetary Union" to differentiate participating nations from the rest of the European Union is seductively convenient, as well as helping to fix the blame. I'm sure that just as the Community Charge became the Poll Tax, the EMU will eventually suffer a similar vulgar translation. But, as you indicate, at this stage it was an inexcusable solecism.*

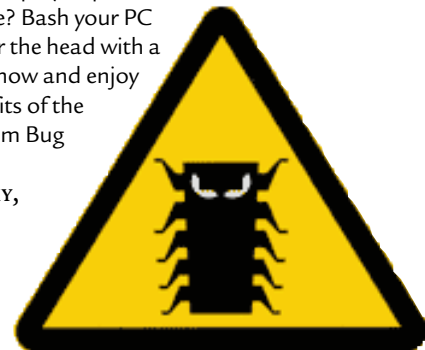
## MAKING THE BEST OF THE BUG

What is all this never-ending fuss about the Year 2000 Millennium Bug? It isn't really the problem it's made out to be. When affected PC users' clocks revert to an earlier date at the start of 2000BC, it will simply have the advantage of allowing them all to believe they are living in the far more sensible past, before daft things such as the Community Charge, VAT, the ECU, pornography over the net or the Millennium Dome were even dreamt of. Business productivity should actually increase, not lessen, due to the marvellous feeling of nostalgia and euphoria it will elicit in staff. It won't matter to most home PC users, either, since their computers will still work — they just won't show the correct date.

So what? I have had a PC for three years and its clock has never worked properly anyway, but I've done all my work on it, as a self-employed person.

My advice? Bash your PC clock over the head with a hammer now and enjoy the benefits of the Millennium Bug early.

DAVID SKY,  
CUMBRIA



## E-ASY MONEY — COMPU SERVE REPLIES

I read with interest Barry Fox's column (*Straight Talking*, PCW Jan '99). I would like to point out that CompuServe is not the only company suffering from spam messages, some of which have fraudulent intent. In fact, I can say with a great deal of confidence that CompuServe members receive far fewer spam messages than those of other services, due to the sophisticated anti-spam technology we employ. It is not common practice for businesses to disclose the methods they use to protect their

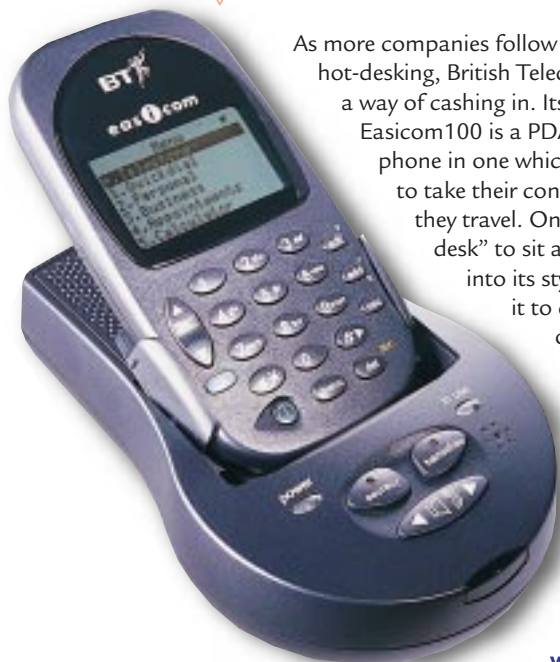


customers, but I can assure Barry Fox that we work closely with the relevant authorities to ensure that the integrity of our service and our members is not compromised. The decision whether or not to prosecute is not

always within our control, and in any case, I would rather that we prevent fraud. So, I applaud Barry Fox for his contribution to educating internet users about potential problems. On the subject of paying for the CompuServe service, he is a little wide of the mark. Industry analysts such as Ovum and Datamonitor have commented that online service providers like CompuServe have little to fear and I am happy to report that their forecast is correct. After the initial burst of activity, attrition levels have dropped dramatically: less than five percent of our "retiring members" are going to FreeServe or similar. Another interesting statistic is the rather larger number of customers asking for support in trying to re-install CompuServe's software which is, in some circumstances, made inoperable when FreeServe is installed. This is a privilege for which they would have to pay FreeServe £1 a minute if they were to call on them. Does CompuServe still seem expensive?

MARTIN TURNER  
MANAGING DIRECTOR, COMPU SERVE UK

## Hot stuff



As more companies follow the route to hot-desking, British Telecom has seen a way of cashing in. Its smart Easicom100 is a PDA and hands-free phone in one which enables the user to take their contacts with them as they travel. Once they find a "hot desk" to sit at, they can drop it into its stylish holster and use it to chat to their mates or business contacts.

(See our review, p88.)

**Price Easicom 100, £79.99**

**(£68.08 ex VAT). Easicom 150 PC link,**

**£34.99 (£29.78 ex VAT). Contact**

**BT 0800 374283**

[www.bt.com](http://www.bt.com)



## About time

Apple's new range of watches prompts you to "Think different" with funky designs to liven up dull wrists. With a choice of round or distinctive "apple"-shaped bodies, these watches offer the choice of a clockwise (MacTime) or anti-clockwise (Think Different) movement. **Price Think Different £29.95 (£25.49 ex VAT), MacTime £37.50 (£31.92 ex VAT). Contact AppleWatch 0181 570 4263 [appwatch@aol.com](mailto:appwatch@aol.com)**

## In a spin

OK, it's a CD-ROM drive. We've seen it all before. But this 40-speed model is worthy of a *Gadgets* slot if only for the fact that at this price it must be one of the most economically priced on the market. To reach spin speeds of which even Wonder Woman would be envious, it incorporates a "ball balancer" device to automatically compensate for slightly out-of-balance discs, resulting in smoother operation and fewer spin-downs, improved reliability due to lack of vibration, and quieter operation.

**Price £35.24 (£29.99 ex VAT)**

**Contact Cyber Drive 00 49 21 02 38 00 60**

[www.cyberdrive.de](http://www.cyberdrive.de)



## There's a kind of hush



At just 32dB, In Focus' new LP750 data/video projector is the quietest around. Smaller and lighter than ten bags of sugar, claims Infocus, it can easily be carted between meeting rooms and can be hooked up to a PC via a standard 15-pin data connector or USB. It automatically upscales VGA and SVGA, simultaneously compressing 1280x1024 images for optimum viewing in its native XGA (1024 x 768) resolution. NTSC, PAL and SECAM video standards are supported and it will project images with a diagonal of between 30in and 300in, even in a full-lit conference room.

**Price £7,044.13 (£5,995 ex VAT)**

**Contact In Focus UK 0181 213 2100 [www.infocus.com](http://www.infocus.com)**



## Dream machine

Out now in Japan, Dreamcast is Sega's attempt to regain a hedgehog's share of the games console market. Its Windows CE operating system may not do it any favours, but with a 128-bit 200MHz processor and second-generation PowerVR 3D graphics, it'll have arcade fans drooling. There's 16Mb of RAM, a custom 1Gb CD format and a controller with a tiny PDA. Titles include Virtua Fighter 3tb and Sonic Adventure.

**Price** (Currently unavailable in the UK)  
**Contact** Sega 0181 996 4613  
[www.sega-europe.com](http://www.sega-europe.com)

## The big squeeze

The fashion for squeezing as much as possible into an incredibly thin notebook has reached the Sharp labs. Just an inch is all it needs to squeeze in a 233MHz MMX Pentium and 11.3in SVGA TFT display. At 1.4kg it's perfect for a briefcase, and with an add-on battery life of up to 8.5 hours it's great for extended business trips. USB and 4Mbps IrDA ports let users connect to peripherals like digital cameras, printers, scanners and a handheld PC.

**Price** £2,226.63 (£1,895 ex VAT).  
**Add-on battery** £182.13 (£155 ex VAT). **Contact** Sharp 0800 262958  
[www.sharp.co.uk](http://www.sharp.co.uk)



## Back to bass

Does your personal stereo not quite supply the sounds you're used to hearing in clubs? Are your tinny old headphones a bit of a disappointment? Maybe what you need is the latest in a range from Philex Electronic, whose SLW-250 headphones have to be *felt* to be believed. While the low-frequency amplifier recreates the sound of a powerful speaker system, a unique vibration effect puts you right at the heart of the music. With separate controls for volume and bass amplification, they're a bass-lover's dream.

**Price** £19.99 (£17.01 ex VAT) **Contact** Maplin  
01702 554000  
[www.maplin.co.uk](http://www.maplin.co.uk)



## Travel mate

First of all, we had the LS120 drive capable of squeezing 120Mb of data onto a special 3.5in floppy disk. Now Sony has upped the ante with the HiFD, a 200Mb floppy drive. Currently available as an external device which connects via the parallel port, this smart, grey gadget should make it a doddle to cart around all those resource-hungry PowerPoint presentations. Watch out for a full review in next month's PCW.

**Price** Around £149 (£127 ex VAT)  
**Contact** Sony 0990 111999  
[www.sony.co.uk](http://www.sony.co.uk)

# reviews

This month sees a host of important new releases fighting for space on the pages of a packed *Reviews* section. How could we start with anything other than Hewlett-Packard's impressive **JORNADA**? Taking two already established ideas — that of a notebook and the Windows CE operating system — and putting them into one smart unit has produced a first-class flyweight with impressive battery life. And just as we were going to press, **MICROSOFT MONEY 99** Financial Suite and a beta release of **INTERNET EXPLORER 5** became available. We lift the lid on these two prestigious products to see if it's worth dumping your earlier versions and stepping up to the new breed of accounts and browser applications. Elsewhere this month, **CANON** and **MICROTEK** fight it out in the ultimate battle of the scanners, **CREATIVE LABS** creates an impression with the **BANSHEE** graphics card, and **ADOBE IMAGESTYLER** gives your dowdy web graphics a makeover. We investigate the joys of hot-desking with **BT'S EASICOM** and keep our accounts in order with **PASTEL PARTNER 5**. Check out our new **HEAD TO HEAD** feature as the Jornada and Acer's TravelMate battle for briefcase space. As ever, we like to hear from you, so if you would like to see two products go head to head, email your ideas to me direct.

NIK RAWLINSON, REVIEWS EDITOR  
[NIK\\_RAWLINSON@VNU.CO.UK](mailto:NIK_RAWLINSON@VNU.CO.UK)



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## VNU European Labs



VNU Labs tests all kinds of hardware and software, from PCs to modems to databases. All our tests simulate real-world use and for the most part are based around industry-standard applications such as Word, Excel, PageMaker and Paradox. Our current PC tests for Windows 95/98 and NT are the SYSmark tests from BAPCo. In all our performance graphs, larger bars mean better scores.

## Ratings

- ★★★★★ Buy while stocks last
- ★★★★ Great buy
- ★★★ Good buy
- ★★ Shop around
- ★ Not recommended

# Hewlett-Packard Jornada

## Next-generation notebook

**A Windows CE notebook that takes an alternative approach to mobile computing.**

As an alternative to PalmOS and Psion's Epos, Windows CE has had a rough ride so far. Main criticisms include sluggish performance and an overly graphical front-end that isn't practical on low-resolution screens. But now, out of the mist rides Hewlett-Packard's new contender, the Jornada. It's the first machine to run Windows CE Professional Edition, codename Jupiter, which now supports VGA and SVGA screens. We tested a pre-production prototype; it will be available in the UK in the first quarter of 1999.

**The Jornada** measures just 9.7x7x1.3in and weighs in at a feather-light 2.5lbs. It sports an STN (super twist nematic) 640x480 screen and has the general feel of a notebook, complete with proper trackpad rather than a touchscreen. Where it differs is in its lack of floppy, CD-ROM or hard drives. The absence of drives has a three-fold advantage: higher reliability, lower power consumption, and more space for the battery. The Lithium-Ion power pack consequently takes up nearly half the volume of its case.

Power consumption is further reduced by the StrongARM SA-1100 CPU, which runs at 190MHz but consumes little power. Hence battery life is long enough to save you constantly fretting about it. HP claims up to 10 hours and our tests pretty much bear this out. Ten hours is long enough to work continuously for a full day, or use it for a week or so intermittently. There's also the option of an extended battery, the same size but with 50 percent extra capacity. The lack of drives, however, means that you have to rely on RAM, and there is only 16Mb for both system use and storage: you'll need to manage it carefully.

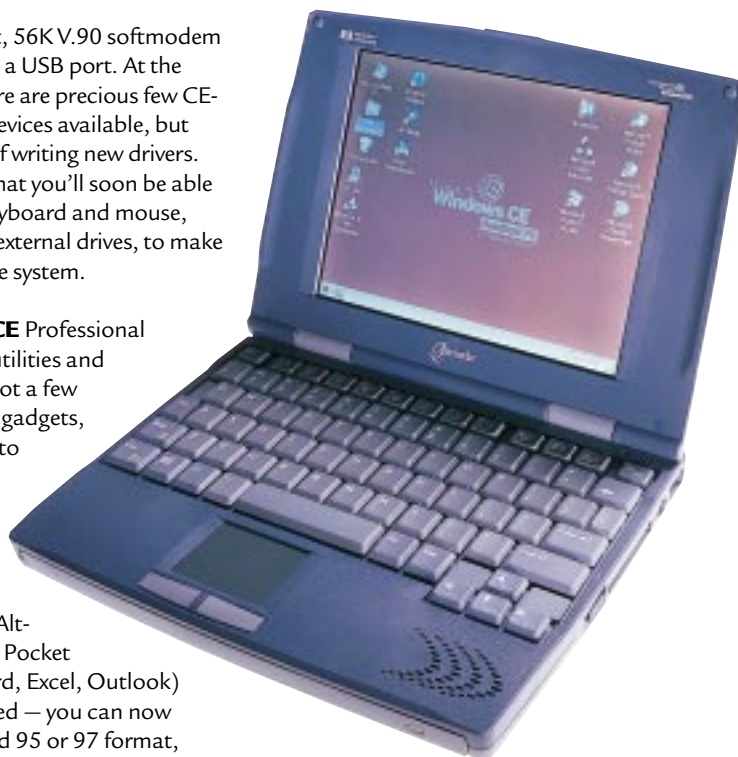
Looking round the edges at the ports, there's a Type II PC Card slot on the left side and a Compact Flash slot on the right. The back is far more interesting:

a VGA output port, 56K V.90 softmodem and — wait for it — a USB port. At the time of writing there are precious few CE-compatible USB devices available, but it's only a matter of writing new drivers. What it means is that you'll soon be able to connect up a keyboard and mouse, and possibly even external drives, to make it into a standalone system.

**With Windows CE Professional** comes enhanced utilities and applications. It's got a few more desktop-like gadgets, such as the ability to choose your Windows colour scheme, and you can even switch between applications with Alt-Tab. The standard Pocket Applications (Word, Excel, Outlook) have been enhanced — you can now save in native Word 95 or 97 format, for example. Pocket PowerPoint has a particularly useful new feature that you can use in conjunction with the VGA output: it can be configured so that the LCD shows your presentation notes alongside a reduced version of each slide, while the VGA output displays only the presentation at up to 1024x768 resolution.

There are now limited editing facilities: you can set up a simple title slide, and change the slide order.

**A brand-new addition** to the family is Pocket Access. This allows database viewing, editing and creation but only supports tables and queries. Connecting via the softmodem and starting up Pocket IE3 shows that the StrongARM provides enough processing power to make web browsing feasible: Pocket IE3 supports frames, JavaScript and cookies, so most sites work as well as they do on a desktop machine. Pocket Outlook still has no facility for logging in to POP3 mail servers that require secure password authentication, so if you have a



Microsoft Network account you are, ironically, stuffed.

We've left the best bit till last. Those who have been constantly frustrated at the abysmal quality of the keyboards on CE devices need worry no longer. The Jornada's keyboard is superb, and allows practically full-speed touch-typing within a couple of minutes.

DAVID FEARON

• See our Head to Head review of the Jornada vs the Acer TravelMate on page 120.

### PCW DETAILS

★★★★★

**Price** £849 (£723 ex VAT)

**Contact** Hewlett-Packard 0990 474747

[www.hp.com](http://www.hp.com)

**Good Points** Superb keyboard. Great battery life. VGA screen resolution. USB port.

**Bad Points** Only 16Mb RAM, and augmenting it will be expensive.

**Conclusion** We loved the Jornada, but you'd need to think carefully about going for this rather than a real sub-notebook at a similar price.



# Microsoft Money 99

## Pound watcher

Software that keeps an eye on all your outgoings well into the new millennium.

In the USA, both Intuit and Microsoft launched the '99 versions of their personal finance packages some months ago. However, in the UK Microsoft stole the lead in this thriving market at the end of October. Money 99 was announced in both a Standard version and the full-featured Money 99 Financial Suite, which is reviewed here.

**A major objective** of Microsoft for personal finance software is to integrate short-term transactions and account management with long-term planning. If you enter or change data in one area, Money 99 Financial Suite automatically updates all other relevant areas. This minimises data entry, maximises consistency and integrity, and, most important of all, delivers some powerful new features. You'll encounter one example on first running the program. Money 99's Personal Profile interview establishes basic facts about your financial aims and these can include your spouse or partner if you wish. Money 99 then recommends how you can use the program most effectively, with links to relevant areas.

Another impressive feature is the Lifetime Planner. Using your personal profile and other account data, this helps you to achieve long-term goals: children's education, retirement, another guppy for the aquarium. Providing you're diligent

▶ **BASED ON THE RESULTS OF YOUR PERSONAL PROFILE INTERVIEW, MONEY 99 MAKES CERTAIN RECOMMENDATIONS ON HOW YOU CAN MAKE BEST USE OF ITS MANY FEATURES**

about entering pertinent data and keeping it up to date, such monetary milestones should then be based on your financial status.

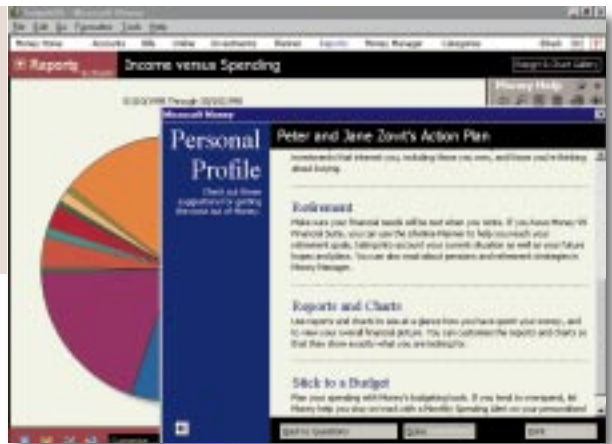
It would take lengthy assessment to check whether Money 99 gets its sums right, but Microsoft claims that Lifetime Planner and other Money 99 features have been endorsed by the Independent Financial Advisors Association.

With your 2020 round-the-world trip confidently planned, what about today, this week, this month? Money 99 Financial Suite is pretty strong here, too. For a start, basic navigation and control is good, based on the new browser-style interface introduced in Money 98. This now has an enhanced Home Page, with two main purposes. First, it's a

launching pad to the program's other nine main sections: Accounts, Bills,

Online, Investments, Planner, Reports, Money Manager and Categories, plus Money's Help system. But it's also a customisable summary of your personal finances, current news and web links.

**Another fundamental aim** underpins Money 99 Financial Suite: to complement local PC hardware and software features with online services. For example, Money 99 Financial Suite will use a new web site, [moneyXtra.com](http://moneyXtra.com), to help manage personal investments. The PC will provide the local storage and preparation of an



integrated portfolio; the web will provide rates, mortgage opportunities, share prices and dynamic links to other relevant information. Microsoft intends this to be the top personal finance site in the UK, but it was not up and running in mid-November at the time of our review, so we'll have to wait and see.

**Online access** to financial institutions could become a key buying criterion for this application. Money 99 Financial Suite now lets you connect to seven leading UK banks for downloading statements, transferring funds and

**With your 2020 round-the-world trip planned, what about today?**

paying bills, with more banks anticipated soon. If you're running a small business or are self-

employed, then you'll welcome the new Invoicing section. This now includes full Sales Ledger with payment tracking, aged debt report, and support for Avery labels and pre-printed stationery.

There's still scope for user interface improvements such as a forward navigation button and variable font sizes, and the Help system has some surprising omissions. But overall this latest offering is great value for your you-know-what. The latest version's greatest strengths lie in the long-term planning areas.

TERRY PINNELL

### PCW DETAILS

★★★★★

**Price** £49.99 (£42.54 ex VAT)

**Contact** Microsoft 0345 002000

[www.microsoft.com/uk/](http://www.microsoft.com/uk/)

**System Specification** Pentium 90, Windows 95, 98 or NT 4.0, 16Mb RAM (24Mb for NT), 40-120Mb hard-disk space, CD-ROM/sound, modem for online features.

**Good Points** Planning integration. Home Page. Online banking.

**Bad Points** Help omissions. Interface flaws. Web site not ready.

**Conclusion** Detailed enhancements and a few major new features are needed, but right now, before Quicken 99 appears, Money 99 Financial Suite has the edge.



# MS Internet Explorer 5

## Just browsing

**BETA**

**Paul Smith takes the IE5 beta version out for a test drive, and likes what he sees.**

Ignoring the political and social implications that web browsers, in the light of the ongoing Department of Justice case, seem to engender, we thought we'd give you an insight into the technical aspects of Microsoft's recently launched beta of Internet Explorer 5, with a view to answering two questions that anyone outside the courtroom would think important: is it any good, and should I install it? If you're busy and must dash, I'll get straight to the point: yes and yes. Run along now.

Everyone else can have a more considered view. As it happens, the IE5 beta is a remarkably stable product, considering this is its first wide exposure. But then, IE5 is much less of an upgrade of version 4 than that was over IE3. It concentrates on more thoughtful implementation of some of the good interface ideas in IE4, as well as adding support for new or proposed World Wide Web Consortium (W3C) standards, than on radical performance improvements or greater (or is that dreaded?) OS integration. We tested it under Windows 98 and NT4 (SP3).

**You'll find that** IE5 looks almost exactly the same as IE4, with the exception of a new Go button at the end of the Address box. While this won't be of use to many current net users, new

***The IE5 beta version is a remarkably stable product***

ones are often puzzled by the non-standard obligation to hit Enter after typing in a URL. Start typing an address, however, and you notice a new and significant feature, AutoComplete, part of IE5's adoption of IntelliSense. Type in any part of a web address and AutoComplete will not simply complete it in the clumsy in-box manner of IE4, but will drop down a list, culled from all your Favourites and History lists, of all likely matches. It will also present you with a search option for that term. AutoComplete extends to forms as well:

instead of having to repeat your name, address or password each time you register for a site, AutoComplete can cache these and remind you of them. For those sharing machines, this can be configured and cleared easily.

There is also AutoCorrect, which will fix "http"-type typos and replace backslashes with forward ones.

**IE5 introduces** horizontal Explorer bars. Like the vertical Search and History bars (themselves improved with multiple views and options), the new bars allow you to download mini-browsers that remain on your screen even when you change pages: they work like in-browser ticker tapes.

My favourite improvement is the ability to download whole pages, not just the text. This is a massive leap in usability over IE4, but it still doesn't handle sub-pages (except through subscriptions), nor can it handle multi-mode images such as those triggered by mouse-over events. Another favourite is the improvement in

Security settings. You can now create a list of trusted and restricted sites and give those groups their own security levels. Under the hood, you'll also find some improvements. The IE5 team promise significant performance gains, particularly in tables with data binding. The new fixed-length table could be a boon for layout designers, with the added advantage of progressive rendering; current browsers need to download the whole table before showing it. Other Cascading Style Sheet (CSS) improvements include the fixed



**▲ IE5 PROVIDES BETTER ADDRESS-COMPLETION, AND NEW FEATURES SUCH AS THE EXPLORER BAR AT THE BOTTOM**

and relative positioning for every HTML

element, exposure of the Print object, and dynamic properties that respond as a function of other properties.

**As for the beta's stability,** we had very few problems. Installation was a breeze, compatibility seemed strong and the only problem we encountered was some occasional problems with some Java sites under NT. Oh, and if it's any help, reverting back to IE4 works perfectly. We tried this and found ourselves restored to the original settings we had before. But we now use IE5 regularly and recommend you think about doing the same, particularly if you're a Netscape user. With IE5, the gap between the browsers is growing.

PAUL SMITH

### PCW DETAILS

★★★★★

**Price** Free

**Contact** Microsoft 0345 002000

[www.microsoft.com](http://www.microsoft.com)

**System Specification** Windows 3.1, 95, 98 or NT.

**Good Points** Adds and improves on IE4's usability features.

**Bad Points** Still a beta.

**Conclusion** Stable (and improved) enough for all but the most beta-shy.



# Gateway G6-350

## Compact and bijou

**This mini-tower makes maximum use of space. The result? A feature-packed PC.**

Gateway 2000 has provided PCs in all shapes and sizes in the past, but nothing could have prepared us for the endearing, squat system supplied on this occasion. The G6-350 is available with a standard 200W power supply in an ATX tower or desktop case with various component configuration options. The third case choice, the option under review, is an ATX mini-tower with a 90W power supply. Our tests proved that any initial concerns about the reduced capacity power supply were unfounded.

**The insides of this machine** were almost as impressive as its attractive casing. A powerful 350MHz Pentium II is tucked away under the micro-power supply; this could make upgrading the CPU a little more difficult than in a machine with the standard two-clip squeeze afforded by the Pentium II casing. Of the two DIMM slots parked close by, one is filled with a 64Mb memory module running at the full

100MHz front-side bus speed. Upgrading memory with just one more 64Mb DIMM should be ample for the future needs of most users, but if not, it will support up to a full 512Mb.

Graphics arrive courtesy of STB's 8Mb Nvidia Riva 3D AGP chip placed directly onto the motherboard, scuppering any thoughts of a future upgrade through an AGP path. We were glad, therefore, that the STB NVida Riva is a first-class choice of graphics processor. Sound has been pinned down with Creative Labs SoundBlaster Audio PCI 64V in the form of an on-board chip. Although these aspects have been provided on-board, it is worth noting that disabling various hardware

components through Windows and slotting in your preferred choice is always an option. What this design provides is three spare PCI slots for dedicated 3D accelerators, DVD hardware decoders and so forth, so that future ventures with higher-end multimedia devices are not curtailed. There's still room to install a 56K modem into the PCI half of the final shared bus slot for a much improved performance over the slower ISA version.

**A 6.4Gb Quantum hard drive** should suit most needs, but users opting for the Full option in games installations for faster execution may be a little disappointed with the lengthy installation times — this drive has a spindle speed of up to just 5400rpm. This 5.25in-sized hard disk screwed to the top of the casing is just thin enough to allow use of the spare 5.25in bay for another full-height drive.



With such limitations on space, Gateway has managed to squeeze in a comparably high-performance machine, tidy and with reasonable enough access to allow the end-user to enhance it to suit their own particular needs. It is packaged into an unobtrusive box for tucking into the corner of your study, although we can't help feeling that hiding this cute little fella would be a crime.

**It doesn't stop there.** A 17in own-brand monitor quite capable of supporting a crisp 85Hz refresh rate at a resolution of 1024x768 should suit any GUI user or games player. Finally, as far as hardware is concerned, an Epson Stylus Colour 440 printer is included, which can produce high-quality prints of up to 720dpi. A wide variety of software is included, ranging from Microsoft Home Essentials to a collection of arcade and educational titles, enough to get the first-time owner up and running.

This is a high-quality, well thought out and built machine from a company that can extend its after-sales services to a one year on-site warranty and a further two years parts and labour.

IAN ROBSON

### PCW DETAILS

★★★★★

**Price** £1,291.32 (£1,099 ex VAT)

**Contact** Gateway 0800 552000

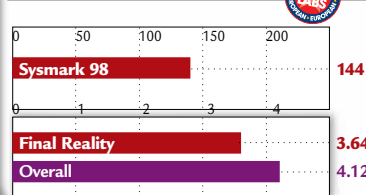
[www.gateway.com/uk](http://www.gateway.com/uk)

**Good Points** Good performance from a well-specified machine.

**Bad Points** No option to upgrade through the AGP path.

**Conclusion** Consideration has been given to the intended user to provide an excellent package for the asking price.

#### PERFORMANCE RESULTS



# ANR Neutron MMO Selection box

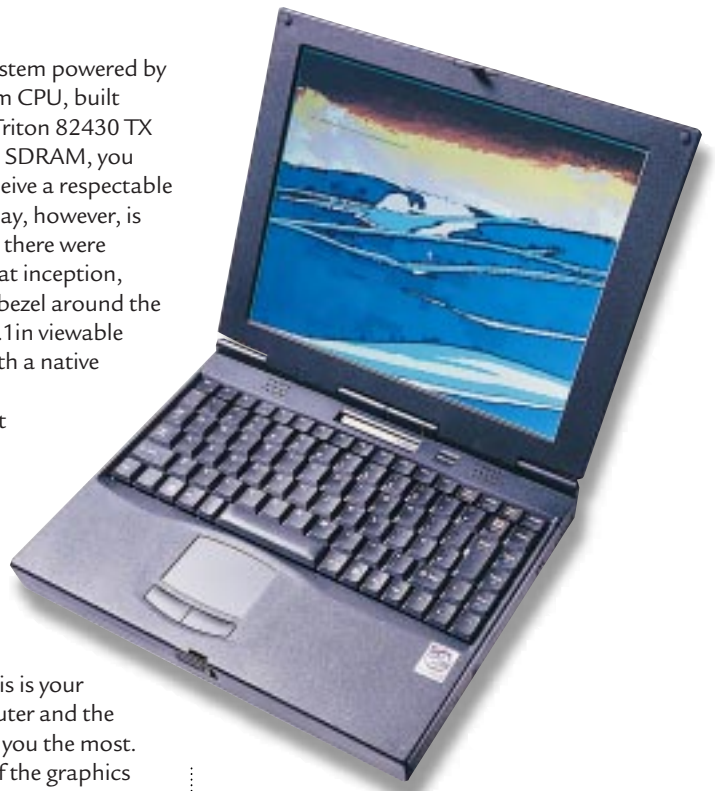
**ANR has produced a good-value notebook whose sum is greater than its parts.**

The Neutron MMO is something of a hybrid in manufacturing terms, with a screen made by IBM, the chassis and motherboard from Compal and a Toshiba CD-ROM drive. In short, nothing in this notebook is actually made by Advanced Notebook Research (ANR).

The ANR brand was established over a year ago by the mail-order company, Tech Direct. The idea was to purchase separate notebook components and oversee the assembly in order that Tech Direct might produce an end product at a cut-down price. This production method is nothing new, and its popularity has grown among purchasers and vendors. The hardware has been carefully chosen to produce a durable, functional piece of equipment, but if the unlikely occurs and you have a problem, then after-sales would be your next port of call. Thankfully ANR adopts a no-fuss policy that extends to waiving all charges for courier collections and deliveries, with at least the equivalent replacement notebook being offered if more long-term attention is needed to repair the user's own.

*This fairly impressive kit has been packaged in a truly rugged manner*

For an entry-level system powered by Intel's 233MHz Pentium CPU, built around Intel's Mobile Triton 82430 TX chipset and with 32Mb SDRAM, you can expect and duly receive a respectable performance. The display, however, is the first indication that there were budget considerations at inception, with almost a full-inch bezel around the screen leaving just a 12.1in viewable diagonal on the TFT with a native resolution of 800x600. Quibbling over that lost inch is less meaningful, however, when you consider that the bright and even quality of the display smirks at the failings of some larger-screened notebooks. After all, this is your window into the computer and the one part likely to affect you the most. That said, the quality of the graphics



displayed is constrained by the 2Mb video memory, although if

you intend to use the unit as nothing more than a temporary workstation, this should prove to be ample.

The MMO's keyboard certainly looked good, but we were disappointed at its occasional lack of response when a key was pressed. This rather let down the supporting glide-pad acting as the pointing-device option, one of the most accurate we have come across, with a 100 percent response rate to a firmer tap acting as a double click. The standard storage option is limited to a 2.1Gb Toshiba E-IDE hard disk, but this is one of the few components where upgrading is an option; with just the loosening of a couple of screws, the disk can be prised out. This particular model also gives users the option of increasing the memory allocation to a maximum of 144Mb.

The 24X CD-ROM and the floppy drives are interchangeable, although we feel that users would be better advised to

make do with the CD-ROM's parallel port connector and use the internal slot for an optional DVD drive instead. Enthusiasts of the more popular multimedia aspects of DVD will be sorely disappointed, however, with the restrictive display and sound offered by this notebook. Only a few titles currently take advantage of the increased capacity of DVD, but users can expect this format to prove more popular in time; you'll just have to be patient.

The full complement of standard notebook components includes two Type II PC Card slots and ports for infra-red and USB connection. This fairly impressive kit has been packaged in a truly rugged manner with a quality of build that is so often lacking in competing vendors' products. The Neutron MMO suffers from a distinct lack of design flair, with the only frill being a rather handy battery-level indicator, but with Lotus SmartSuite 97 and Windows 95 pre-installed it provides everything the average user will need to get going straight from the moment they open the box.

IAN ROBSON

## PCW DETAILS

★★★★

**Price** £1,175 (£999 ex VAT)

**Contact** Dabs Direct 0800 558866

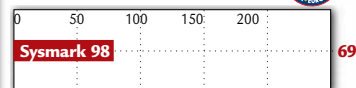
[www.anr.co.uk](http://www.anr.co.uk)

**Good Points** Rugged build with quality display.

**Bad Points** Small storage capacity.

**Conclusion** A faithful tool for the budget-conscious.

### PERFORMANCE RESULTS



# Mitsubishi Diamond Pro 900u

Cut-glass graphics put the sparkle into this **flawless monitor**.

In recent times Mitsubishi has earned a reputation for building high-quality monitors; the company is one of the major suppliers of CRT tubes for the TV and monitor industries. Like Sony, Mitsubishi uses Trinitron technology, in which the screen curves only horizontally while remaining flat along its vertical axis, minimising curvature and enhancing the overall sharpness of the image.



**Mitsubishi is aiming** its new Diamond Pro range at high-end users and graphics professionals for whom colour fidelity and image quality are a necessity. The Diamond Pro 900u fulfils this role in many ways. It has a small grille pitch varying between 0.25 and 0.27mm at the centre and edge, respectively, producing sharper images. It can sustain an impressive refresh rate of 75Hz at

of 1280x1024 the refresh rate increases to 85Hz. Mitsubishi claims that its NF (Naturally Flat) technology provides better image quality than normal shadow mask and aperture grille monitors, and this came through in our

Display Mate tests. What was even more impressive was the consistency of colour reproduction throughout the entire breadth of the screen. The monitor incorporates an anti-glare filter to reduce eye strain and a USB downstream port mounted on the front bezel. The Diamond Pro 900u's controls are easy to access, and the on-screen display is available in six languages. Overall, the Diamond Pro 900u is an excellent choice for the demanding professional.

AJITH RAM

## PCW DETAILS



**Price** £528.75 (£475 ex VAT)

**Contact** Mitsubishi 01707 276100

[www.mitsubishi.com](http://www.mitsubishi.com)

**Good Points** Excellent picture quality. Easy-to-access controls. Anti-glare filter.

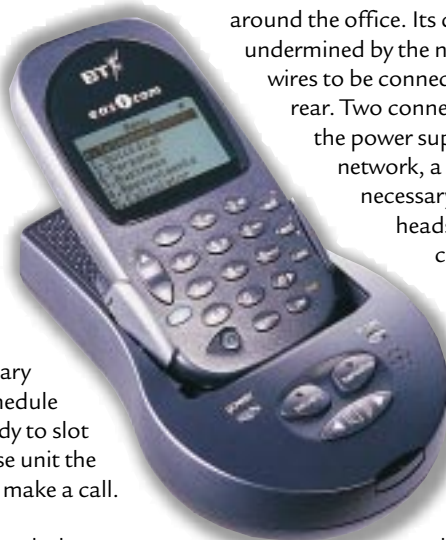
**Bad Points** None.

**Conclusion** A versatile monitor for the demanding user at an attractive price.

# BT Easicom 100 and 150 PC

A fully functional Filofax on a **hands-free phone**.

BT has combined a hands-free phone and a detachable personal organiser to create the Easicom 100. It's supposed to make hot-desking a reality by allowing you to carry your personal contacts, diary and appointment schedule around with you, ready to slot into any available base unit the moment you need to make a call.



**The Easicom 100** is a sleek, compact unit. The base unit is half the size of a standard telephone and the organiser looks like a slimmed-down mobile phone. Unfortunately, the organiser doesn't double up as a headset, so all calls from the Easicom will be broadcast

around the office. Its dinky footprint is undermined by the need for up to four wires to be connected to the base's rear. Two connect the Easicom to the power supply and telephone network, a further two are necessary if you want headset privacy or to connect to your PC.

The organiser stores up to 1,700 contacts, but they have to be typed-in using eight tiny buttons on the keypad, unless you invest in the Easicom 150 PC link. This connects the Easicom to a free serial port, and once installed, data can be entered on the PC and downloaded to the organiser or imported from other PIMs. One thing to watch out for is a

conflict with any Psion or PalmPilot software on your PC. When we tried to connect our Easicom and PC we had a communication error, which was only solved by uninstalling PsiWin. BT admits to having similar problems with PalmPilot software.

URSULA TOLAINI

## PCW DETAILS



**Price** £79.99 (£68.08 ex VAT) for Easicom 100, £34.99 (£29.78 ex VAT) for Easicom 150 PC link

**Contact** BT 0800 374283

[www.bt.com](http://www.bt.com)

**Good Points** Compact footprint. Pocket-sized, battery-powered organiser/keypad. Stores 1,700 contacts.

**Bad Points** Hands-free-only calls. Messy connection. Software conflicts.

**Conclusion** The Easicom 100 makes sure your contacts are always at hand, but hot-desking means buying extra base units and the hands-free phone puts an end to private calls.

# Flatbed face-off Microtek vs Canon

It's a Mexican scanner standoff: Microtek's **Scanmaker X6** vs Canon's **CanoScan FB620P**.

**W**ith scanner prices continually dropping, these two new units from Microtek and Canon represent the upper echelon of affordable flatbeds. Both are priced at just under £200 including VAT, which is more than four times what you could expect to pay for the absolute cheapest units now available. This is great news for the consumer: £200 will now buy you very impressive performance.

**The price range** is one of the few areas of similarity about these two units. Different design approaches give the Canon the feel of a high-end consumer device, while the Microtek has the air of a unit intended for the professional on a budget. The differing philosophies are marked by the physical appearance and build of the two. The Microtek has a hefty metal chassis and an outer case that, although plastic, is very solid. In contrast is the petite, modern-looking Canon, the smallest flatbed we've seen. It's 3.5in shorter than the Microtek and about two-thirds the height.

The Microtek has one little touch that the Canon lacks: a button at the front that automatically activates the Scanmaker software. But it's the more traditional of the two when it comes to scanning technology: it uses a cold-cathode lamp to illuminate the document being scanned, so it needs a few minutes' warm-up time. The Canon, however, sports LED illumination, which means no warm-up and increased life. But so long as you switch the Microtek off when you've finished using it, the lamp should last pretty much forever.

Microtek's more professional design approach is evident when comparing interface and resolution specifications. The Canon has a parallel port interface,



rated at 600x600dpi, with 30-bit internal colour resolution and 24-bit output — a totally adequate basic spec for high-quality scanning. The Microtek, however, goes a little further. It has a faster SCSI interface (but no SCSI card), 600x1200dpi and scans internally at 36 bits, with the

▲ **THE MICROTEK SCANMAKER X6: SOLID AND MEATY**  
 ▼ **BIT OF A SWEETIE — THE CANON CANOSCAN FB620P**

option to output at 36 bits. Scanning at the 36-bit level gives 12 bits for each colour channel, allowing over 68 billion possible colours if the electronics and CCD are of high-enough quality to resolve them. In practice, the real advantage is that more detail will be preserved after image manipulation.

Of course, all these specifications mean nothing unless they're borne out by real-world performance; both the Canon and the Microtek produced high-quality scans. Using standard colour and resolution test targets as well as photographs, detail reproduction was pretty much equal between the two. But the Microtek had the edge with its colour accuracy. Its output demonstrated greater linearity when reproducing a graduated greyscale; the Canon's scans were slightly biased towards darker shades.



Both units have fully featured TWAIN drivers and standalone scanning software, including photocopier-type utilities for use with a printer. The Canon comes with Ulead's iPhoto Express for photo retouching and Caere's Omnipage LE for OCR. Microtek beats it with iPhoto Express and PhotoImpact as well as Omnipage LE and Recognita for OCR and Documagix PaperMaster for document management.

These are both excellent scanners. There's no doubt that the Canon is the more desirable and the one to go for if you're lacking desk space and a SCSI card.

But if you're looking for that bit extra in terms of scan quality and the speed afforded by a SCSI connection, the Scanmaker X6 has the edge.

DAVID FEARON

## PCW DETAILS

### Microtek Scanmaker X6

★★★★★

**Price** £175 (£149 ex VAT)

**Contact** *Midwich Thame* 01379 649200

[www.microtek.com](http://www.microtek.com)

**Good Points** *Hefty build. SCSI interface. Slight edge on scan quality over the Canon.*

**Bad Points** *No SCSI card included. Not as pretty or small as the Canon.*

**Conclusion** *A good buy for those with SCSI in their systems.*

### Canon CanoScan FB620P

★★★★★

**Price** £186.83 (£159 ex VAT)

**Contact** *Canon* 0121 666 6262

[www.canon.co.uk](http://www.canon.co.uk)

**Good Points** *Excellent quality. Super-small. Looks lovely.*

**Bad Points** *Parallel interface is a little slow. Software bundle not as comprehensive as the Microtek.*

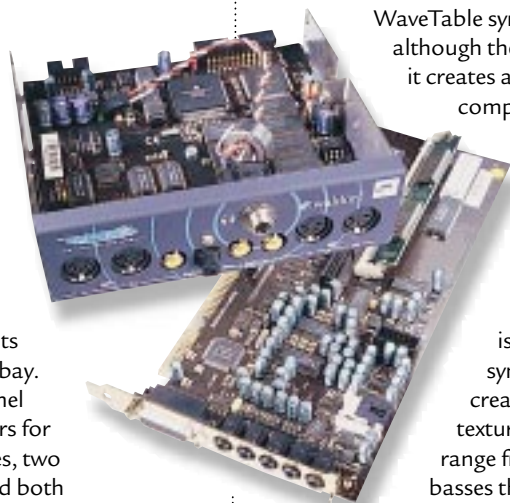
**Conclusion** *The Canon is a great choice for the office user.*

# Waldorf microWAVE PC

Turn up the musical heat with this **genuine synthesiser** for your PC.

The microWAVE PC is an add-on synthesiser module for Terratec's EWS64 L and XL sound cards. Based on Waldorf's microWAVE XT (a professional rack-mounted synth, priced at £1,099), the unit fits into a 5.25in drive bay. Along the front panel there are connectors for two MIDI interfaces, two SP/DIF outputs and both optical and SP/DIF digital inputs.

So what's on the inside, then? Well, just a bunch of DSP chips. Not very interesting at first, but once you hear what they can do you'll be on the phone to Terratec saying *gimme, gimme, gimme*.



The microWAVE is essentially a WaveTable synthesiser, although the sounds it creates are not comparable to your average sound card: there are no pianos or electric guitars. This is a real synthesiser for creating real synth textures. These range from grungy basses through to dreamy, filter-swept analogue pads. The front-end to the system is a software package called microEdit. It looks identical to the rack-mounted microWAVE and provides access to every synth parameter via a series of knobs,

buttons and an LCD display. The synth delivers ten voices of polyphony and is good for up to eight simultaneous parts. That may not be a patch on some sound cards, but doesn't the old maxim say "it's the quality that counts"?

STEVEN HELSTRIP

## PCW DETAILS

★★★★★

**Price** £500 (£425 ex VAT), £100 trade-in for your existing EWS64 XL front panel

**Contact** Terratec 01600 772111

[www.terratec.co.uk](http://www.terratec.co.uk)

**System Specification** Windows 95/98, Terratec EWS64 L or XL.

**Good Points** Stunning sounds. DSP software updates. Every parameter can be tweaked with MIDI controllers.

**Bad Points** On-screen dials do not update after receiving MIDI controller data. Will not work with the EWS64S.

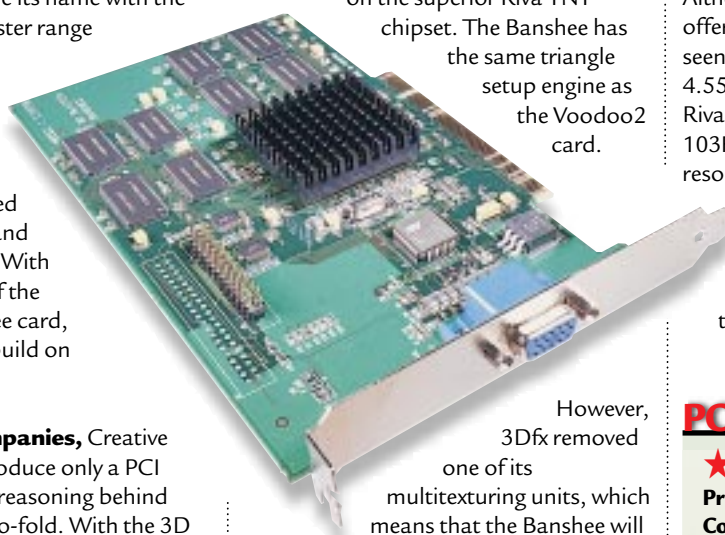
**Conclusion** If you've got an EWS64 L or XL and have £500 burning a hole in your pocket, get the microWAVE now.

# 3D Blaster Banshee

Have a wail of a time with this **PCI graphics card**.

Having made its name with the SoundBlaster range of audio cards, Creative Labs entered the display market last year with its graphics cards based on the Permedia2 and Voodoo2 chipsets. With the introduction of the 16Mb 3Dfx Banshee card, Creative hopes to build on that success.

Unlike other companies, Creative has decided to introduce only a PCI Banshee card. The reasoning behind this seems to be two-fold. With the 3D Blaster Banshee, Creative hopes to attract users with slower, non-AGP Pentium systems who are planning to upgrade. The other reason is that (sensibly) the Banshee will not compete with Creative's own new AGP card based



on the superior Riva TNT chipset. The Banshee has the same triangle setup engine as the Voodoo2 card.

However, 3Dfx removed one of its multitexturing units, which means that the Banshee will run considerably slower than the Voodoo2 in games such as Unreal that use multitexturing. But as the Banshee has a higher fill rate of 100 million pixels/sec, this makes it faster in games that do not use multitexturing.

Although it's a PCI card, Creative's new offering is one of the fastest we have seen. With a Final Reality 3D score of 4.55, the Banshee is second only to the Riva TNT. The card threw an average of 103FPS in the game Incoming at a resolution level of 1024x768. Its 2D performance is also impressive. A copy of Colorific comes with the Banshee, which helps to adjust brightness depending on the ambient lighting.

AJITH RAM

## PCW DETAILS

★★★★★

**Price** £99 (£82 ex VAT)

**Contact** Creative Labs 0118 934 4322

[www.creaf.com](http://www.creaf.com)

**Good Points** Fast 2D and 3D performance. Low price.

**Bad Points** No single-pass multitexturing.

**Conclusion** A good PCI card for those who want to upgrade.

# The safe option

**Fast, reliable and cost-effective data backup on entry-level servers.**

**W**hile the importance of backing up your data can never be stressed enough, the exponential increase in hard-disk capacities isn't making this task any easier. Although tape is the logical choice for data backup, the price of high-capacity tape drives can often be far more than the hard disks they are supposed to be protecting. The introduction of the DAT DDS-3 format alleviated this situation somewhat, as it increased tape capacity to a more respectable native 12Gb while the drives have now dropped below the £1,000 mark. However, DAT DDS-3 is not the only option, as Tandberg Data is keen to point out. Its latest SLR6 data cartridge drive is positioned to compete directly with DAT DDS-3 and offers an identical 12Gb of storage capacity on a single tape.

**Traditionally**, DAT has always been ideal for entry-level server backup; so what's so special about the SLR6? For starters it's substantially cheaper, with a bare internal version costing £594 — around £200 cheaper than the DDS-3 competition from Sony and Hewlett-Packard. The media is more expensive, but when you see a 5.25in data cartridge you'll understand why: it's built like a tank, making DAT tapes look positively flimsy. Finally, and more importantly, our tests showed the SLR6 to be around 50 percent faster than DDS-3 drives for backup operations.

The technology is substantially different: DAT drives use the same helical scanning system found in video recorders, whereas the SLR6 uses a fixed

TF/MR (Thin Film/Magneto Resistive) head. The SLR6 media is likely to last longer as only a single internal capstan is used to keep the tape pressed against the recording head. To tension and align the DAT media, it must be manually threaded around multiple capstans.

To test the SLR6 we used a Dell PowerEdge 2300 server configured with dual Pentium II 400MHz processors,



256Mb of memory and running Windows NT Server 4. Storage was dealt with by a 9Gb Seagate Barracuda Ultra2/LVD SCSI hard disk. To get the best out of the tape drive and to avoid any contention with the hard disk subsystem, the SLR6 was connected to a dedicated Adaptec AHA-2940UW Ultra2 PCI host adapter card. To

represent the average workgroup server we copied a 3Gb collection of documents, spreadsheets and presentations along

with a liberal mixture of web-based data, video clips and graphics. To test the read and write capabilities of the SLR6 it was asked to secure the entire 3Gb of data, run a full tape-to-disk verification and then restore the whole lot back to the server. Backup software came courtesy of Computer Associates' ARCserve and Seagate's Backup Exec. For comparison

purposes we also ran the same barrage of tests against two DAT DDS-3 drives, Sony's SDT-9000 and HP's DAT24.

**For backup performance**, the SLR6 demonstrated a best average speed of 112Mb/min with Backup Exec. Not bad, considering the native transfer rate is quoted by Tandberg Data at 72Mb/min. The native transfer rates of the HP and Sony drives are quoted at 60 and 72Mb/min, respectively, and neither drive managed to make any significant improvements on these speeds while securing the same data. During the read-

based verification and restoration tests the SLR6 demonstrated a noticeable drop in

performance, but still managed to stay above the 100Mb/min mark. The DAT DDS-3 drives held firm at their native transfer rates for both operations.

Clearly, the SLR6 offers a solid alternative to DAT as a backup solution for entry-level servers. It's much faster, substantially cheaper, and the data cartridges look and feel reassuringly solid. Tandberg Data also offers an external server-kit version for £837 which comes complete with all cables and a full backup software bundle from Seagate covering all major operating systems.

DAVE MITCHELL

**The 5.25in data cartridge is built like a tank**

## PCW DETAILS

★★★★★

**Price** Internal - £697 (£594 ex VAT).  
 External server kit - £983 (£837 ex VAT)

**Contact** Tandberg Data 01582 769071  
[www.tandberg.com](http://www.tandberg.com)

**Good Points** A server backup solution that's fast, cheap and reliable.

**Bad Points** Read operations are noticeably slower than when writing to tape.

**Conclusion** A cheaper and faster alternative to DAT DDS-3 for securing data on entry-level servers. Media build-quality is excellent.

# Sharedware

## Double take

Here's a **clever gizmo** that allows two people to use one computer at the same time.

If you have ever thought that you needed an extra PC but found the cost daunting, then perhaps Sharedware is the solution for you. It's a variation on existing systems that allow users to connect an extra monitor, mouse and keyboard to an existing Windows 95/98 PC, thus allowing two people to use it at once.

The nerve centre of Sharedware is an ISA card, connected via cable to an external communications box, which in turn hosts ports to attach the monitor, keyboard and mouse, none of which are included with the kit. Windows detects the new hardware after rebooting and requests the drivers. One reboot later, everything is installed and ready to go.

The system is accessed through its own control panel, an icon for which is installed in the system tray. This gives the user access to the display properties of the secondary terminal — driven by an onboard Cirrus Logic chipset — that allows a maximum resolution of 800x600 at 24-bit colour. The control panel also allows the user to tailor the method of shutting down the PC (or killing off the secondary terminal) which is a clever idea as it stops one person from shutting down in the normal way and at the same time killing off the other user's tasks. Once the settings have been finalised, the second terminal can be launched. This task can also be set to



happen as soon as the PC boots into Windows, allowing simultaneous usage to occur from the start.

Using both the real machine and the terminal together was initially impressive. Performing basic tasks such as copying files on the hard drive or using simple applications to, for example, type a letter in Word, did not seem appreciably slower than the speed at which it runs on a standalone system. In fact, at this point you could quite easily forget that you are sharing a PC with someone else. Further usage, however, showed up some sadly unavoidable problem areas.

Performing anything remotely processor intensive, such as graphical manipulation or a large print job, locks up the terminal: this makes it pretty much unusable until the task has been completed. The manufacturers claim that your kids can play games while you word-process, but you could only run the most basic of games to make this a reality. The manual does recognise that certain problems like this can occur, and it attempts to address them with a

variety of tips. For example, it advises enabling Windows profiles as this will allow each person using the PC to customise their own desktop and start menu, furthering the idea of each user running on their own machine. In the end though, there are some limitations users will have to come to terms with. They will have to decide where files are going to be stored and try not to run applications that will slow the machine down.

**It's only really suitable for the most basic tasks**

### CD-ROMs also pose a problem.

While two people can access the drive at once, it is not a practical proposition as these drives do not have the fast access times that hard drives enjoy. £175 for the base model (£275 if you also want the peripherals) seems a high price to pay when you consider that for the same money you could buy a second-hand Pentium PC which would not only do the same job, but would also be more reliable as it allows each user to work independently. It's a good idea, but only really suitable for the most basic of tasks.

DAVID LUDLOW

## PCW DETAILS



**Price** £205.63 (£175 ex VAT)

**Contact** Sharedware 01274 401010

[www.sharedware.com](http://www.sharedware.com)

**Good Points** Could provide a cheap alternative to buying an extra PC, especially if only small tasks need to be performed.

**Bad Points** Can't compete against another fully fledged computer.

**Conclusion** A clever idea which, in practice, only really works for people performing the most modest of tasks.

# Adobe ImageStyler 1.0

## Web site enhancement

Web site development can be **easier than you think** with this innovative graphics package.

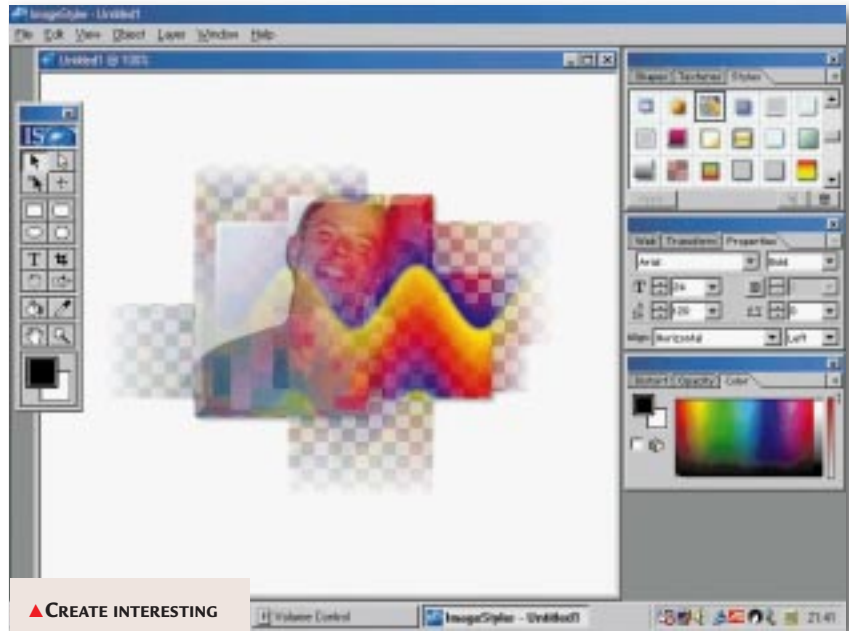
**W**e were pleased to see Adobe's familiar interface taking pride of place in ImageStyler, a package designed to make web graphics production a doddle for the non-web professional. Rather than using "flat" images, it is based around the idea of objects. An object is anything from a shape to an image or a line of text. Each object can be edited in exactly the same way to generate spectacular effects.

**With over a hundred styles** from which to choose, ImageStyler provides the first-time user with plenty of scope. Each style is constructed of up to five textures, or patterns, on different layers. Once applied to an object, the object itself takes on the style. Copying a style places it on the Windows clipboard, so users can paste it onto further objects with a click of the mouse. To save editing time, objects can be linked. When a style is applied to any of the objects, it will be carried across all linked objects, dramatically reducing the amount of time a user needs to spend ensuring that all their graphics look the same.

ImageStyler handles shapes in a similar way. Once a vector shape has been created using the familiar drawing tools, it can be saved in a shapes palette and dropped into other documents. It can also be used as a matte, a part

of the page which allows the image behind it to show through while obscuring the remainder. Alternatively, a line of text can be used as the matte source, giving the impression that the letters have been constructed from parts of the image showing through behind.

Creating JavaScript rollovers might once have been a problem, but no longer. Once the mouse-on and mouse-off states have been drawn, ImageStyler will write all the HTML code necessary to implement them in a browser. In much



▲ CREATE INTERESTING MATTE EFFECTS WITH IMAGESTYLER'S SHAPES

the same way that linking images allows the user to execute multiple style changes in one go, numerous rollovers can be created at once by selecting the objects required and applying the new mouse-over state to the group.

**A major strength** of ImageStyler is the way in which it handles ImageMaps. Most other packages require the user to finish working on their image before calculating the boundaries of their

hotspots. However, because ImageStyler is object-based, it is the objects themselves that are defined as the hotspots and it is with these that each URL is associated. If the object is moved, changed or its size altered, then the boundaries of the hotspot move with it and any necessary changes to the HTML will be immediately implemented.

Users who already have a web site will be able to use the Batch Replace function to freshen its appearance. Graphical styles can be generated to replace formatting commands and the package will hunt through selected

pages, finding any instances of tags and replacing the text to which they relate. Any HTML will be rewritten to accommodate the new graphics, and all tagged text will be imported and rendered as an image.

**Once your masterpiece** is complete, the Autolayout function will slice the image into manageable parts and write all necessary code to enable a browser to reconstruct it as a web page. This allows those parts of an image with solid colour coverage to benefit from the highest levels of compression without image-quality compromises.

NIK RAWLINSON

*Makes web graphics production a doddle for the non-web professional*

### PCW DETAILS



**Price** Price £99.88 (£85 ex VAT)

**Contact** Adobe 0131 458 6842

[www.adobe.com](http://www.adobe.com)

**System Specification** Pentium processor, Windows 95/98/NT4, 32Mb RAM (64Mb recommended), 40Mb free hard-disk space, 256-colour display (24-bit colour recommended), CD-ROM drive.

**Good Points** Fast. Easy. Innovative.

**Bad Points** None.

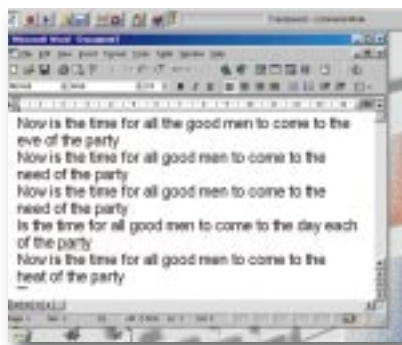
**Conclusion** A must-have tool for amateur and even professional web developers.





# Philips FreeSpeech 98

**No-frills speech recognition software that does the job.**



**F**reeSpeech runs under Windows 9x and Windows NT 4.0. Philips recommends a P200MMX with 64Mb to run it but we used a Pentium II 266 with 64Mb and found it sluggish. Following installation, FreeSpeech 98 appears as a taskbar. A green or red traffic light indicates whether you can dictate directly into the current active application — which was most of the

ones I tried. For its price, FreeSpeech 98 works quite well and correcting mis-recognised words is now handled better than before. Accuracy levels are respectable and, as ever, the more you train it, the better it gets. It's easy enough to use but nowhere near as sophisticated as its (admittedly more expensive) rivals. It offers none of the "smart" number formatting found in VoiceXpress or ViaVoice 98, so, for example, you have to say "pounds 45" rather than "45 pounds". You must also explicitly switch modes to perform dictation, correction and "command and control" tasks.

**I was supplied** with the Philips SpeechMike (also available direct, priced £69.99 from [www.speechmike.philips.com](http://www.speechmike.philips.com)), a gizmo that harks back to the golden days of dictation machines. It's a handheld device comprising a microphone, speaker and trackball. FreeSpeech 98 is very "modal" and putting a button on the SpeechMike to change dictation modes is a good idea.

The Pro version offers more "tape-deck" controls. For those who are constantly leaving their desks, the SpeechMike is more convenient than a headset. But good though the SpeechMike is, it isn't perfect. The playback volume has to be set low in order to avoid feedback, documentation is non-existent and the trackball lacks decent mass.

ROGER GANN

## PCW DETAILS

★★★★

**Price** £29.99 inc VAT; £69.99 inc VAT for the SpeechMike)

**Contact** Philips Speech Processing 01206 755555 [www.freespeech98.com](http://www.freespeech98.com)

**System Specification** P166. Win95/98 + 32Mb RAM, or Win NT + 42Mb RAM. SoundBlaster-compatible sound card. Mic.

**Good Points** Basic speech product. Well specified. Reasonable accuracy. Good value.

**Bad Points** Unsophisticated. Modal nature breaks the workflow.

**Conclusion** Reasonable accuracy and features, but not as good as the market leaders.

# Works Suite 99

**A bumper bundle of the latest software product versions.**

**W**orks Suite 99 is a software bundle that should easily take care of almost all your basic computing requirements. However, because it has become common practice for hardware manufacturers to throw in a big bundle of software with a new PC, it's difficult to imagine anyone rushing out to buy it. Nevertheless, be warned; if your PC is too old, it won't be able to

handle these brand-new programs. And, because Suite 99 is classified as an upgrade product, you'll have to already own Microsoft Works, Word or WordPerfect in order to purchase it. But if you're just looking to update your existing bundle, or you don't like what came with your PC in the first place, then Works Suite 99 is a good choice.

**Works Suite 99 includes** six individual products: Word 97, Works 4.5, Money 99, Encarta World Atlas 99, AutoRoute

Express Europe 98 and Graphics Studio Greetings 99. This works out to about £20 per product, which is really quite a bargain. Word 97 is Microsoft's flagship word processor and has just about every function you could possibly wish for. Works 4.5 is made up of a calendar, spreadsheet, and database to help

## PCW DETAILS

★★★★★

**Price** £119 (£101.28 ex VAT)

**Contact** Microsoft 0345 002000 [www.microsoft.com](http://www.microsoft.com)

**System Specification** Must already have a licence for an existing Microsoft product (check the version numbers carefully to make sure you qualify). P90 or higher, Windows 95 or NT 4.0 or higher, 24Mb RAM, between 354 and 469Mb hard-disk space.

**Good Points** An affordable way to upgrade to the latest versions.

**Bad Points** You may already own one or more of the packages.

**Conclusion** If you're a stickler for getting the latest releases, this is the best way to do it.

you keep track of addresses and other personal information. Money 99 takes care of the financial side of things, while Encarta World Atlas 99 and AutoRoute Express Europe 98 will let you know exactly where you are and where to go next. Finally, Microsoft also throws in Graphics Studio Greetings 99, a nice little program that lets you produce your own greetings cards, stationery, email "cards" and more. In short, Works Suite 99 includes everything but the kitchen sink, and for a nice price, too.

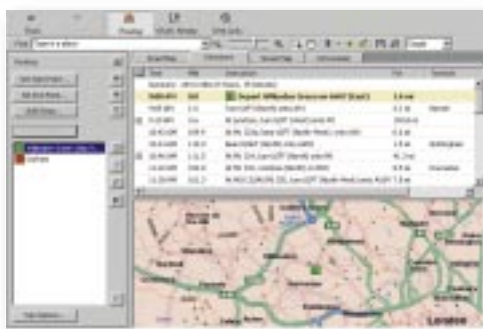
SUSAN PEDERSON

▶ MAKE A VALENTINE FOR YOUR SWEETIE WITH WORD 97



# AutoRoute Express Great Britain 2000

A new version of Microsoft's **on-the-road** route finder.



route-planning CD-ROM in the UK. It certainly is comprehensive, but you'll have to spend a lot of time on the road to make it a worthwhile buy. Apart from the new and improved maps, the software also contains some useful new features to make it easier to plan your journey. The Snap-Routing function allows you to edit your route (to avoid roadworks, say) by simply dragging and dropping it to a new area. The route length is then instantly recalculated.

**W**here do you want to go today? Microsoft provides the answer to that question with the newest version of its route-finder software. Using the latest, most up-to-date maps from Ordnance Survey, AutoRoute Express Great Britain 2000 purports to be the best mapping and

**Users of the last version** will also notice that Microsoft has now plumped for a web-style browser interface. This style works especially well with a wheel mouse, allowing you to "roll" over an area with ease. A zoom slider is also included to make it easier to focus on a particular area. Pocket Streets for

## PCW DETAILS

★★★★★

**Price** £59.99 (£51.05 ex VAT); £10 refund to existing AutoRoute customers.

**Contact** Microsoft 0345 002000  
[www.microsoft.com](http://www.microsoft.com)

**System Specification** Multimedia PC with Pentium-class processor, Windows 95 or NT Workstation 4.0 or later, 16Mb RAM (32Mb recommended), 75Mb hard-disk space.

**Good Points** Fast, accurate and complete routing and travel information.

**Bad Points** You can get similar products for less money.

**Conclusion** Road warriors will want to snap this up fast.

Windows CE allows you to export maps to palmtops, which can be handy when you're wandering around an unfamiliar city. The package also includes restaurant, sightseeing and hotel information from a variety of travel guides to help you decide what to do while you're on the road, as well as web links for more information on various destinations. If you spend a lot of time travelling by car, this package is probably a worthwhile purchase.

SUSAN PEDERSON

# Steinberg B Box



Almost five grand's worth of **drum kit** here — Bah-boom!

**A**udio software has come a long way indeed over the years and is gradually replacing the need for expensive sound equipment altogether. Steinberg's latest product is a virtual, pattern-based drum machine. Working with standard .wav files, B Box can play back up to eight instruments

you to customise drum sets and import your own samples; up to 20 samples can be grouped in a single bank.

**If you have worked** with drum machines before, the look and feel of B Box will be familiar. The 16 buttons along the lower half of the screen represent the 16 steps, or semi-quaver notes, in a musical bar, and instruments are selected by clicking on their respective channels. Each channel

simultaneously and comes equipped with samples from 15 classic drum boxes. These include the Linn 9000, Roland CR78, TR-808 and TR-909, and the more obscure Simmons SDS 5. Put another way, there's the equivalent to five grand's worth of kit included here. B Box is not limited to these sounds alone though, as it enables

has a volume fader and switches for mute and distortion. In the Edit menu there are options to pan instruments using random or linear fades. Other goodies include the shuffle slider, which enables you to apply different grooves, and the ability to stream patterns off to disk as a stereo .wav file. In use, B Box is a doddle to use but does not provide the flexibility of a sampler, whether it's software based or on board a sound card.

STEVEN HELSTRIP

## PCW DETAILS

★★★★★

**Price** £59.99 (£51 ex VAT)

**Contact** Arbiter Pro Audio 0181 207 5050  
[www.steinberg.net](http://www.steinberg.net)

**System Specification** Windows 95/98, 100MHz Pentium-class processor, 24Mb RAM, 16-bit sound card.

**Good Points** Bags of drum samples. Very easy to use.

**Bad Points** No support for DirectX plug-ins. Cannot sync to other music applications.

**Conclusion** Cannot compete with much cheaper shareware titles on the internet.

# Mathcad 8 Professional Power tool

**This renowned computational program is now even better, with many new features.**

Most professional scientists and engineers will know of Mathcad, a tool for the production of technical reports, incorporating mathematical computations with relevant documentation. With a user base of over one million worldwide, MathSoft's flagship product is serious stuff.

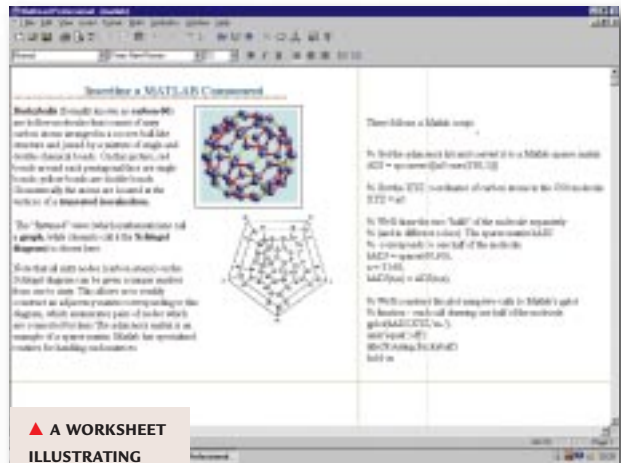
A Mathcad worksheet is a portable, live, mathematical object. Typically, the formulas needed for a project, together with the values and ranges of the parameters/variables, are entered via the keyboard and sub-menus of appropriate toolbars. Equations can be solved symbolically via the Maple engine, or numerically, and the results plotted. The worksheet is a freeform document consisting of repositionable text, maths and graphics regions. It is live, in the sense that when a formula or parameter is changed at any particular position, the consequences ripple through subsequent sections. This includes the updating of numerical results and the re-plotting of graphs. In text mode, Mathcad acts as a word processor to annotate the calculations and, if required, to provide a document of a quality suitable for publication or presentation.

**So what's new** in version 8? First, the mathematical function base has been incrementally improved and vectorised, along with a significant upgrade to the solve block facility. In particular, there is a new linear programming solver — I'm surprised it wasn't there before. Under the heading IntelliMath is the smart formatting and conversion of units, and the new automatic selection of solution method and numerical integration technique. Fortunately, this can be overridden. The three-dimensional graphics option has been completely updated, based on the OpenGL engine. You can create multiple objects in a

single plot, with any of a number of formatting options, then rotate and zoom in real time for alternative perspectives. As far as document production is concerned, there have been a number of improvements. Headers and footers can now include bitmap images, bulleted and numbered lists, full font support, and export in HTML for web publication. For the security-conscious, the facility to lock areas of a worksheet against the accidental altering of computational results has been extended to the collapsing and password protection of sensitive parts.

Mathcad cannot do everything by itself and it is acknowledged that, for some tasks, users often exploit more specialised software: a spreadsheet for the creation and storage of large data sets or a dedicated numerics or statistics application for computational work. In version 7, the functionality of Mathcad was extended by providing for the insertion of such applications as specialised OLE objects, called components. Applications explicitly supported as components now include Excel, Matlab, and two of MathSoft's own packages: Axum, for the production of more sophisticated graphics, and S-Plus, for statistics. Furthermore, using the MathConnex environment, very complicated systems can be built from several components and controlled in a visually interconnected way.

The main user guide has been slimmed down considerably without much real loss. And, there is now a reference manual of functions and



▲ A WORKSHEET ILLUSTRATING THE INSERTION OF A MATLAB COMPONENT

operators, but for the more advanced features, particularly MathConnex, I still find the user-guide cryptic and the online sample files inadequate. On the other hand, there is the excellent web-based resource called the "Collaboratory", which is an archive of contributed downloadable worksheets. It also hosts a lively email-based discussion forum.

**Considering the job it does**, there is no competitor to Mathcad. There are mathematical and statistical packages which are more powerful computing engines, but none are as flexible as this latest incarnation of Mathcad. Particularly useful is its spreadsheet-like "what if" facility for experimenting within a live document. It's fun to use, too.

NIGEL BACKHOUSE

## PCW DETAILS

★★★★★

**Price** £464.13 (£395 ex VAT). Upgrade £175.08 (£149 ex VAT)

**Contact** Adept Scientific 01462 480055  
[www.adeptscience.co.uk](http://www.adeptscience.co.uk)

**System Specification** Pentium 90 or higher, Windows 95/98/NT (4.0 or higher), 16Mb RAM, 30Mb hard disk, CD-ROM drive.

**Good Points** The spreadsheet-like "what if" facility. Excellent 3D graphics.

**Bad Points** It is too easy to overlap adjacent parts of a worksheet. Inadequate documentation and examples of advanced features, such as components.

**Conclusion** Mathcad 8 Professional is an easy-to-use, powerful, technical tool — sums really can be fun!

# Pastel Partner 5

## Accountable software

**More features at a lower price than the others — put a smile on your accountant's face.**

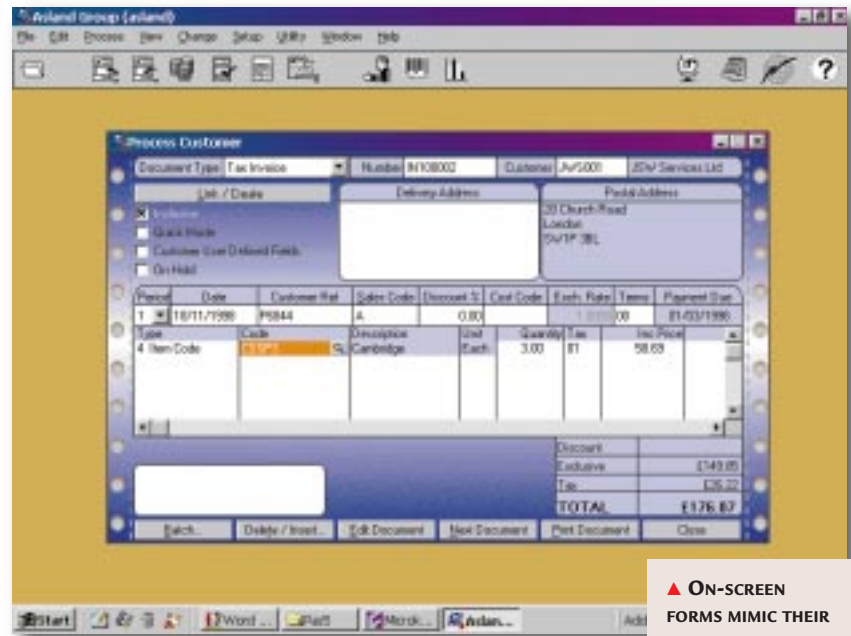
Compared with products from Sage and Intuit, Pastel Partner is a relatively unknown accounting package. Nevertheless, its publisher is keen to let it be known that it has over 100,000 users worldwide. It's truly good value for money, offering features which competitors can only include in packages costing several times the price.

Pastel is available in different editions, depending on the features required. The Bookkeeper edition (£299 ex VAT) offers the basics but users wanting a stock database, purchase orders, sales orders and quotations will need the Accounting edition (£649 ex VAT). In addition to the Accounting edition's facilities, manufacturing and point-of-sale functions can be added. All these facilities are available for £849 (ex VAT). Even so, this keeps Pastel Partner well inside the budget price range of accounting software.

Each edition allows you to do the books for as many separate companies as you like. Up to 40 users can be set-up on the software, and if corporations opt for a multi-user licence for Partner, up to 40 operators can use the software over a network at any one time. Multi-currency support is also built into the package, which is remarkable for the price band.

**Version 5 introduces** greater support for the internet. Purchase orders, quotations and so forth can now be emailed, and reports can be exported in HTML format. Wizards have been added *en masse*, simplifying the package for beginners, and external documents such as those produced in Word or Excel can now be linked to customer or supplier records.

Traditionally, accounting software has been designed so that data, once entered, cannot be altered, requiring the use of separate credit notes to make corrections. Although this can help prevent employees from fiddling the



▲ **ON-SCREEN FORMS MIMIC THEIR PAPER-BASED EQUIVALENTS**

books, many users find it irritating. Pastel arguably offers the best of both worlds, allowing two types of data entry: batch and online. With batch entry, users can type in, say, a group of invoices and later bring them up on the screen to make corrections. Once they are happy with the entries, they can choose to upload them to the rest of the program. Online entry, however, means that transactions, having once been entered, are permanently stored.

**Entering the data** itself is quick and easy and it is a very simple process to produce a quote and then later convert it into an invoice. Pastel Partner has desktop publishing facilities built-in, so attractively designed invoices and other

documents can be created, doing away with the need for pre-printed stationery.

Labels can be printed from customer and supplier databases and these databases can also be mail-merged into other programs. Unlike many accounting packages, Partner does not have end-of-month routines, so users can add-in mislaid invoices from previous months. It will calculate VAT returns, too,

providing a totalled report of a VAT quarter's transactions. The user interface is straightforward. Keyboard shortcuts make the mouse practically redundant and enable quick data-entry. The windows mimic their paper-based equivalents and version 5 has a redesigned System Navigator which provides quick access to the program's features.

For medium-sized businesses, Partner 5 is an attractive package. Small companies which need neither multi-currency nor multi-user facilities might do better to consider Sage or QuickBooks. But if you're after a more powerful package, you won't go far wrong with Pastel.

ALEX SINGLETON

**For medium-sized businesses, Pastel is an attractive package**

### PCW DETAILS

★★★★★

**Price** £351.33 to £997.58 (£299 to £849 ex VAT) for single-user versions.

**Contact** Pastel 0161 630 7000

[www.pastel.com](http://www.pastel.com)

**System Specification** Windows 3.1 or later, 8Mb RAM.

**Good Points** Multi-currency and multi-company support.

**Bad Points** No paper tutorial.

**Conclusion** Ideal for medium-sized businesses.

# Impulse Organica

## Act on it

**Easy creation of complex, curved models. A serious tool for the 3D modeller's arsenal.**

If you have ever used a 3D modelling package in an attempt to design an object from scratch, you will appreciate that it is far from easy. The limitation of constructing a three-dimensional object on a two-dimensional surface means that it's easy to get confused and it's hard to visualise the finished object while it is being designed.

Conventional modelling tools are usually based around additive primitive modelling. For instance, to construct a table, you start with a primitive object like a cube, squash it until it's very thin, then put narrow cylinder primitives at each corner for legs. But using normal primitives to make objects means it's hard to produce models with smooth curves, and once a model has been designed, it's more or less impossible to alter curvature and profile.

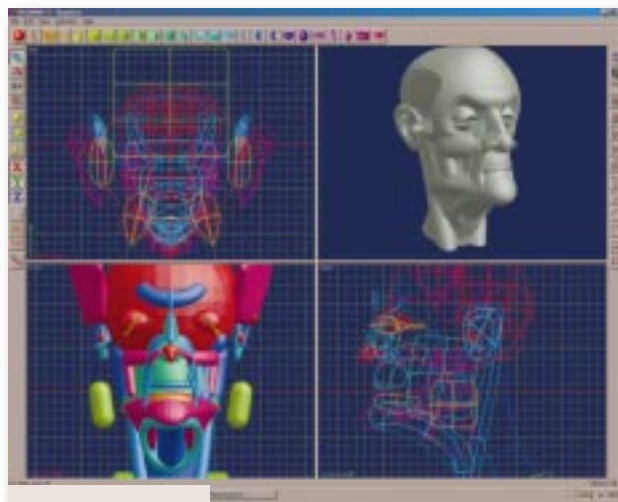
**Organica claims** to be able to solve the problems of producing natural-looking objects. Its modelling method is best described as a cross between NURBS and metaball schemes. NURBS (non-uniform rational b-splines) are characterised by frame objects, created by the user, which the computer then fleshes out to create a curved object.

Metaball or "blob" modelling works by using primitives which are attracted to each other, like drops of water: two metaball objects will tend to merge into

each other, giving a nice Plasticine-type effect. Organica manages to combine these schemes. You can select from a total of 25 primitives, ranging from the standard cubes and cylinders to wedges, sphere sections and pipes. Once you have more than one primitive in a scene, they will tend to locally attract each other, so the interface between two intersecting objects is naturally smoothed. This

makes it possible to create amazingly sophisticated-looking objects with just three or four primitives. And, because each primitive placed by the user is a NURBS-like framework with the application itself generating the polygons, the detail level can be altered at any time. This allows you to work with low-resolution objects for speed, then globally increase the polygon count for final exportation to a fully-fledged renderer. As well as the blending together of object geometry, you can do the same with colour. Objects have both a mesh strength and colour strength attribute, which controls how strongly they're affected by other objects in the vicinity.

**Organica has some** impressively innovative features for ease of use. One of the best is the colour-coding of axes. When an object is selected, its "poles" are coloured red, green and blue for x, y and z, respectively. So, when applying operations such as stretching, which is done via a slider control, it's easy to see the direction in which the object will be stretched; you just select the appropriately coloured slider.



▲ **ORGANICA'S INTERFACE IS REFRESHINGLY STRAIGHTFORWARD**

The interface is extremely clean and straightforward. Almost all the available functions are represented by the three toolbars which flank the screen. There is a range of deformations applicable to each primitive, including stretching, shearing, tapering, twisting and bending. Objects can be grouped together and given a hierarchy, but that's about as far as features go.

**The simplicity** of Organica is both a strength and a weakness. It's a very focused tool, purely dedicated to one style of modelling. In contrast, most 3D design packages have a stack of features ranging through face, edge and vertex editing, to Boolean operations, finite element simulation

and rendering engines. The only concession Organica makes is with its simple animation facility, letting you render to an AVI file. The basic idea is that you create your objects and export them to an animation and rendering package. To this end, you can export in DXF, 3DS, LWO and IOB formats.

Organica's online manual makes great play of its ease of use and the fact that it's fun to play with. There's no doubt that this is true, but really, it's only of any use to those with a *serious* interest in 3D modelling — the software price alone takes care of that.

DAVID FEARON

**Organica has some innovative features for ease of use**

### PCW DETAILS

★★★★★

**Price** £235 (£199.95 ex VAT)

**Contact** POW! Distribution  
01202 716726

[www.pow-dist.co.uk](http://www.pow-dist.co.uk)

**System Specification** Pentium processor, 32Mb RAM, 8Mb free hard-disk space, CD-ROM drive.

**Good Points** Extremely easy to create complex, curved objects.

**Bad Points** Essentially, that's all it does.

**Conclusion** A superb tool for the 3D modeller's arsenal, but it has limited use as a standalone application.

# Cakewalk Pro Audio 8

## Music maestro

**Professional music software with even more muscle to create spot-on sounds.**

Since the early days of PCs, Cakewalk has been one of the mainstream products in music software, constantly providing state-of-the-art features. In addition to the usual MIDI sequencing and music notation tools, Cakewalk has been offering digital audio support since version 4. Taking advantage of the newer Pentium processors and DirectX technologies, later versions added high-quality stereo, real-time, audio effects such as reverb, chorus, parametric EQ and delay/echo.

This latest version offers notable additions especially suited to the professional user. The number of audio tracks has been increased from 64 to 128, and the number of effects which can be applied to each one is now 256 — if you can afford the hardware to handle it.

Furthermore, these effects now use 32-bit floating point processing. Version 8 also brings you the ability to work with professional sound

quality, using 24-bit and 96kHz audio. These sound specifications give you between one-and-a-half to twice the quality of CD audio (if one can make a direct analogy between numbers and sound quality). For these sound specifications you will need a 24-bit audio card but Cakewalk also supports 16-, 18-, 20- and 22-bit audio cards.

**Cakewalk's user interface** has had a facelift, too. A new addition is the Console View designed to simulate a professional mixing console. It provides a single window from which you can control your projects such as recording tracks, applying processing effects, creating sub-mixes, and automating volume and panning levels. Powerful editing features include monophonic audio-to-MIDI conversion, Remove Silence, Fade/Envelope and Crossfade, Quantize and Groove Quantize, Extract audio timing and Reverse audio.

► **PROFESSIONAL SOUND REPRODUCTION WITH CAKEWALK PRO 8**

StudioWare panels give you remote-control access to studio gear such as mixers, effects units and synths. A 256-bank MIDI System Exclusive Librarian

enables you to store synthesiser settings and sounds on your PC.

Special facilities to prepare music and sound for the internet include the conversion of audio files to the RealMedia streaming format. Other features enable you to open AVI, MPEG or QuickTime movies in a video playback window, edit their sound and re-save them. Users

can synchronise sound with frame accuracy, allowing them to compose a music score for a video.

### Cakewalk Application Language

(CAL) incorporates programming attributes to automate operations or create entirely new editing functions. The MIDI FX plug-ins are a new feature which enable non-destructive, real-time MIDI effects such as Arpeggiator, Quantize, Delay/Echo, MIDI Filter, Transpose and Velocity Scale to be applied.

The program now includes sophisticated music notation facilities for editing and printing musical scores, and you can prepare either individual parts or a conductor's score. You enter the music directly into the notation window using the mouse, or convert it to musical notation from a performance you have played-in from a keyboard. Furthermore, you can notate up to 24 staves per page, with guitar chord grids,



*...one of the best music programs on the market*

percussion notation, lyrics, title, composer name, expression text, hairpins, pedal markings and enharmonic spellings. In addition to printing, a special window can display lyrics in sync with the music to help singers perform a song. Vector-based audio mixing displays lines on top of audio waves for graphical editing of automation data, and a number of other features include custom layouts, templates and tutorials.

With all these features, you have nearly everything you need to record and edit a musical performance on your PC and to create a final mix for cutting a CD. Cakewalk 8 is certainly one of the best music programs on the market.

PANICOS GEORGHIADES

• There's a Cakewalk Express workshop on p240.

### PCW DETAILS



**Price** £279 (£237.45 ex VAT)

**Contact** EtCetera Distribution

01706 228039 [www.cakewalk.com](http://www.cakewalk.com)

**System Specification** Windows 95, Pentium 120, 16Mb RAM, Win95-compatible sound card and/or MIDI interface. Printer and MIDI instrument (optional).

**Good Points** Full-featured. Digital audio effects. Automation language.

**Bad Points** For the dedicated musician only.

**Conclusion** Top-of-the-range music recording, editing and performance software.



# Acer TravelMate vs Hewlett-Packard Jornada 820e

Which should you choose for **mobile computing**? We step out with CE Professional and Windows 95 sub-notebooks.

Everyone knows that in the future, all computers will be mobile. But then, 20 years ago, everyone knew that we'd soon have domestic robots doing all the housework.

The fact is, current mobile-computing technology is still very much in its development phase and remains the poor relation to the desktop PC. There are some crucial areas of design which, rather than improving, are remaining static or even deteriorating as the inevitable compromises arise from trying to stuff computers with the equivalent power of a desktop machine into a case the size of a Fisher-Price toy.

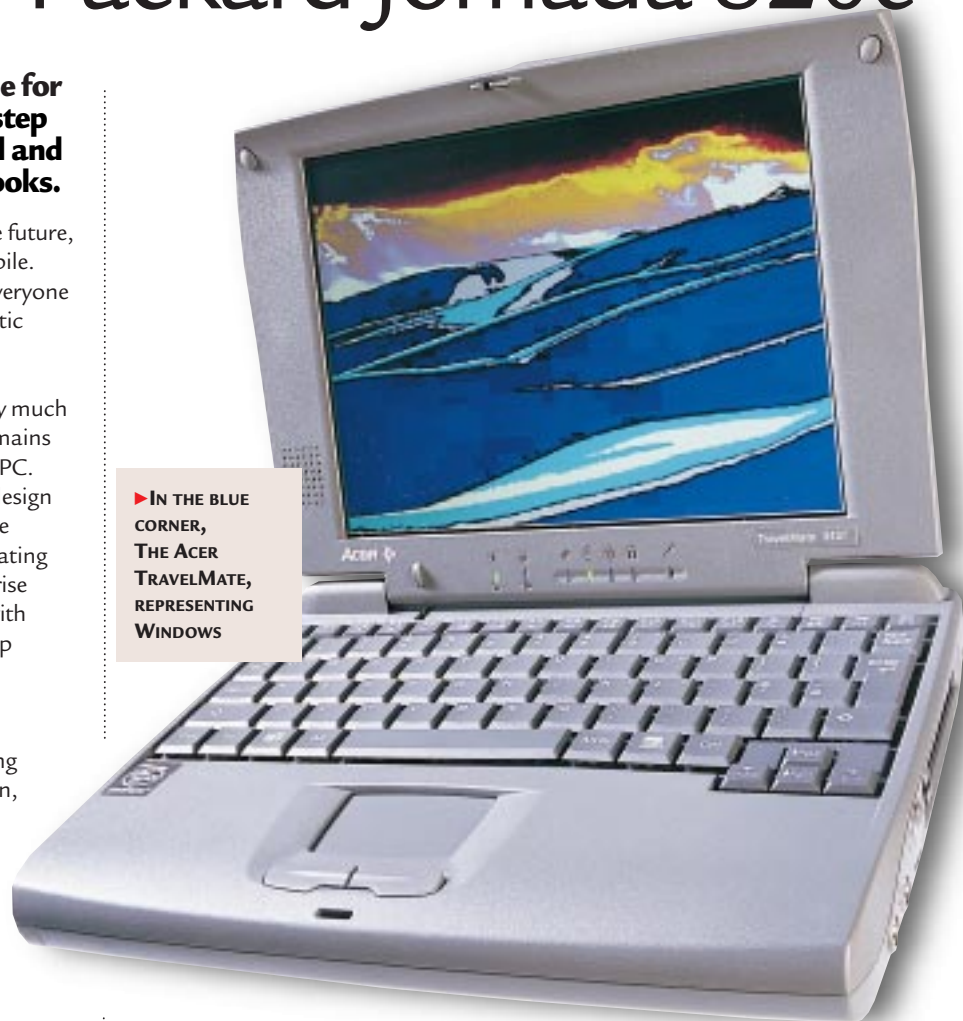
**Mobile computers** are not being developed from just one direction, though. On one side we have the prosaic top-down approach: notebooks and sub-notebooks with Pentium processors, hard drives and Windows 98. But on the other side we have the PDA (personal digital assistant). PDA designers tend to be pragmatists, focusing on designing small, convenient devices with the emphasis on ergonomics and reliability rather than

**Current mobile-computing technology is still very much in its development phase**

ever-higher specifications to impress the punters into parting with their cash.

Windows CE is not the best example of this philosophy but it is at least the first version of Windows that doesn't need a hard drive. And the release of Windows CE Professional Edition (aka Jupiter) has given us a platform that has more of the features of a desktop OS but which also runs on devices with limited computing resources.

► **IN THE BLUE CORNER, THE ACER TRAVELMATE, REPRESENTING WINDOWS**



So, if you're looking to buy a mobile computer that's as portable as possible but does more than simply store your contacts' details, should you go for a Jupiter-based machine or plump for a full Windows 95/98 sub-notebook? We got our hands on Hewlett-Packard's

new Jupiter-based Jornada and compared it to Acer's rather neat TravelMate, a Windows 95 sub-notebook with a remarkably similar form factor.

#### ► **First impressions**

We were struck by the machines' resemblance to each other. The TravelMate measures 235 x 175 x 38mm (WxDxH) when closed. The Jornada is 247 x 179 x 33mm and it's slightly

lighter at 1.185kg compared to the TravelMate's 1.345kg. Both units are similarly styled, with fairly rounded edges and a slight taper to the front of their cases. They both have integrated 56K modems, essential for keeping in touch while on the move.

From their internal specifications, the differences soon became obvious. The Jornada boasts an Intel StrongARM processor running at 190MHz and an 8.2in STN screen with a resolution of 640 x 480. It has 16Mb of RAM as standard, but no other storage.

The TravelMate has a mobile Pentium 233MMX processor, 32Mb of RAM and a 3.2Gb hard drive, and comes with an external floppy drive. The TravelMate 312T that Acer sent us had a better screen than the Jornada's, an 800 x 600 TFT. The 312T is rather more

## LAPTOP ERGONOMICS

For most users, the primary factor affecting the usability of small machines like these is the keyboard. The form factor is plenty big enough to enable a decent layout, with the consequent benefits in comfort for reasonably prolonged use. This is where the Jornada scores its first big hit against the TravelMate, demonstrating the compromises which manufacturers must

concede in order to shoehorn a full Windows 95 machine into such a tiny box. Essentially, there's hardly any room left for anything else, so the keyboard is noticeably less spacious than the Jornada's. This is partly due to the TravelMate's case being 12mm narrower in the first place, but the keyboard is also almost 20mm shallower, front to back. Consequently, the keys are considerably smaller

and more crowded than the Jornada's, and tend to force you to type with your fingers perpendicular to the keyboard in order to avoid hitting more than one key at a time. This, in turn, can lead to hunched shoulders. By contrast, the extra area of the Jornada's keys means you can flatten your fingers and relax your shoulders, which leads to a more relaxed posture and less fatigue in the long run.

expensive than the Jornada, however, at around £1,400 (£1,199 ex VAT). The more comparable 312D model has a 640 x 480 DSTN display but is otherwise identical save for the exclusion of an external CD-ROM drive that the 312T has as standard. It costs around £940 (£800 ex VAT).

### ➤ Battery life

The issue of battery life is one of those areas which, as far as conventional notebook design goes, has remained pretty much static despite continued advances in technology. As the chemists come up with new formulations to give higher energy densities, so processors get faster and more power hungry, leading to stalemate. There's also the problem of space. Both the TravelMate and the Jornada sport the latest Lithium-Ion battery technology which, among other benefits, gives the highest energy density of any commercially available option. But after cramming in the processor, chipset, memory and hard drive, there's only enough space left in the TravelMate for a battery measuring 60 x 75 x 21mm.

By contrast, the lack of a hard drive and the more compact nature of the electronics in the Jornada leaves enough space for a battery which takes up nigh-on half the volume of the case. It measures 214 x 82 x 19mm and, in total, that's around three and a half times the battery volume of the TravelMate's power pack. Coupled with

this is the Jornada's PDA heritage, which means low power consumption.

That StrongARM processor doesn't have the computing grunt of the Pentium in the TravelMate, but it consumes a lot less power.

The hard drive in the TravelMate is another big drain on its batteries.

The result? The quoted battery life of the TravelMate is 2.5 hours.

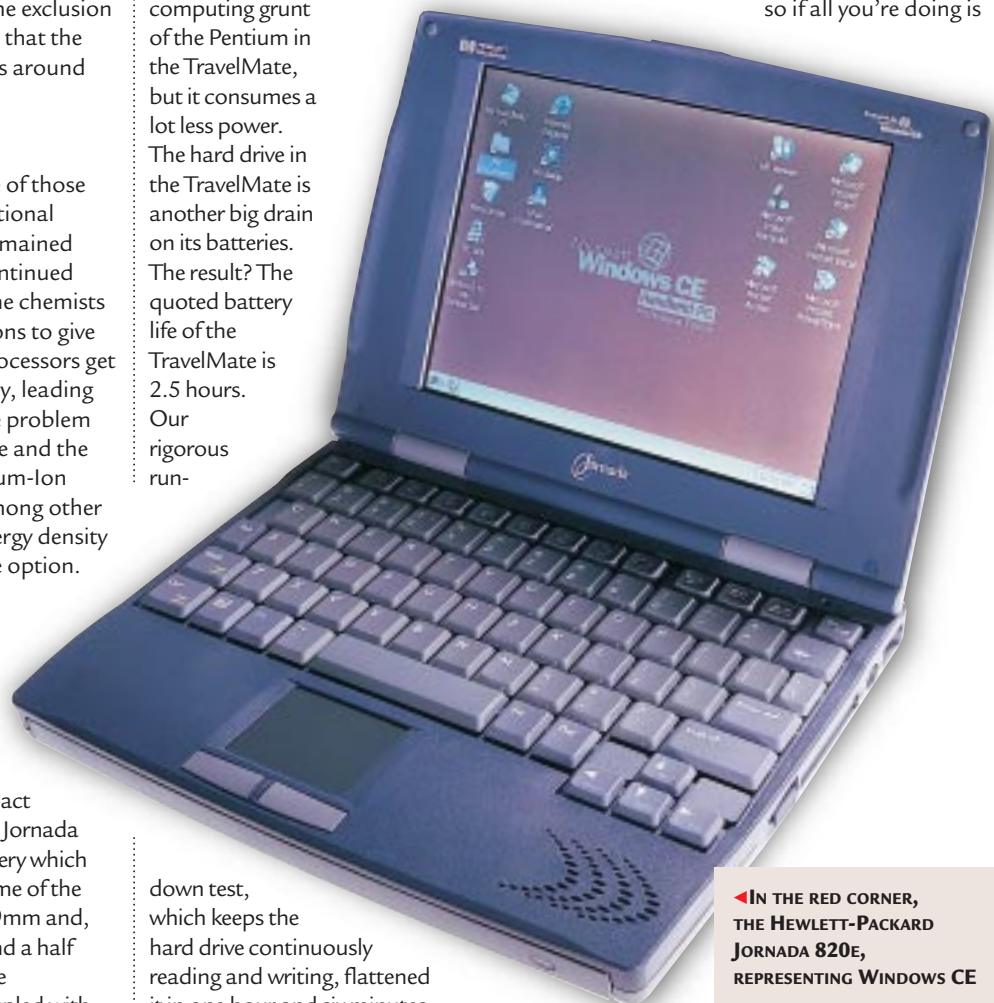
Our rigorous run-

down test, which keeps the hard drive continuously reading and writing, flattened it in one hour and six minutes.

In real-world use, you'll probably get around two hours out of it. But the solid-state Jornada has a quoted life of ten hours and we managed around eight without difficulty.

If you've never used a notebook in anger, perhaps this doesn't seem so significant; eight hours isn't that much longer than two. But it's above the crucial threshold where you'll never manage to flatten the battery in one sitting. Anyone who has ever sat on the train, away from any mains power points, trying to work on a document, will know what we mean. The constant worry that you've got to work fast before your state-of-the-art mobile powerhouse becomes an inert lump of metal in your travel bag, is annoying and reduces productivity. You tend to spend as much time checking the battery's meter as you do thinking about your work.

With the Jornada, this is not an issue. You can work for a full day with no fear of the battery dying. And there's even a reasonable prospect that, should you not be in an area with the correct mains supply, you can survive for a week or so if all you're doing is



◀ IN THE RED CORNER, THE HEWLETT-PACKARD JORNADA 820E, REPRESENTING WINDOWS CE



checking your email once a day or taking notes in meetings.

Another important point to remember is that although the total battery life of the Jornada is around four times greater than the TravelMate's, you can do useful work for more than four times as long, thanks to the fact that the Jornada is an "instant on" device. The TravelMate's boot-up sequence takes around 40 seconds, and that's with a clean installation of Windows; after a couple of months, the nasty application garbage will build up and could double that. Even using the suspend option takes at least 30 seconds of precious battery juice, as the contents of memory is spooled to the hard drive.

If your usage patterns mean you regularly start your system up for short periods and then shut it back down again, you're wasting a significant portion of your battery's capacity.

#### Reliability

There's no doubt that modern electronics are highly dependable, even if the software that runs on them may be prone to frequent tantrums. But any engineer will tell you that for absolute maximum reliability, a system needs as few moving parts as possible.

The TravelMate has one large, relatively vulnerable, moving part — the hard-disk drive. Although modern mobile drives are highly resistant to abuse, they're still the most vulnerable part of the system if the unit is dropped. The heads of a hard drive literally fly above the surface of the disk, using the airflow to keep themselves at the correct distance above the platters. If the drive is knocked sharply while it's spinning (and it does need a very sharp knock), the heads can crash into the platters, pulling off flakes of magnetic coating which then fly around inside the drive and soon render it useless, destroying all your data.

The Jornada, being a solid state device, will suffer from none of these problems. There's a caveat here, though: the Jornada contains standard, volatile, RAM. In other words, if power is removed for any reason, all data is lost, so make sure that the two backup cells are replaced when the system indicates they're low.

#### Applications

Up until now, it looks like the Jornada has been having a pretty easy time of it. Better battery life, better keyboard, less moving parts to go wrong, and slightly cheaper, too. The TravelMate, however,

## JORNADA OR TRAVELMATE: WHICH IS THE ONE FOR YOU?

It's clear that although outwardly similar, these two machines, and the design philosophies they represent, have different target uses. As such, neither is better nor worse than the other. The Jornada's attributes mean that it's the answer to the prayers of many people fed up with increasingly faster processors when all they need is a

machine they can use to take notes, check their email or write the next chapter of their novel while sitting in the park. But the TravelMate will still be the choice of those who have neither the time nor the inclination to get used to a new bunch of applications with reduced features. And, you can always plug it in when the battery gets low.

has yet to play its aces, and they lie in those power-hungry but high-specification innards which allow it to run Windows 95 with no problems. For many, all the talk of ergonomics and the benefits of solid state electronics count as nothing in the face of this fact.

Although the situation as regards Windows CE applications is improving, there's nothing remotely approaching the range of software available for the standard Windows platform. This particularly applies to the Jornada, running as it does under Windows CE Pro with a class of processor new to the operating system. There are very few existing third-party applications which will run unmodified. Even if there were, current CE machines, the Jornada included, have neither the processing power nor the storage capacity for the applications to rival the complexity of those available for the full-size platform.

**Remember**, the Jornada comes as standard with 16Mb of RAM which it needs to use as temporary storage for program execution (the equivalent of system RAM on a normal machine) as well as application and data storage (the equivalent of a hard drive, ZIP disks or floppies). In other words, it essentially sports 8Mb of RAM and an 8Mb RAM disk, although it's possible to vary the balance between run-time allocation and storage. Compare this with the 32Mb of system RAM and 3,200Mb (3.2Gb) hard disk that ships as standard with a TravelMate.

**When you're used to** standard office applications, it's annoying to discover that you suddenly can't do a word count in Pocket Word or create a graph in Pocket Excel. With the TravelMate you

can work in an identical fashion to the way you do things on your desktop machine because, as far as the hardware goes, it is a desktop machine. And, for the myriad specialist and scientific applications out there that only run on Windows 3.1x or 95/98, there's just no alternative if you need to use them in the field.

DAVID FEARON

### PCW DETAILS



#### Acer TravelMate 312

**Price** Around £940 (£800 ex VAT) for the 312D, up to around £1,400 (£1,199 ex VAT) for the 312T.

**Contact** Acer 01753 487000

[www.acer.co.uk](http://www.acer.co.uk)

**Good Points** A powerful Windows PC in a tiny case. Runs all your desktop applications. A lot of hardware for your money.

**Bad Points** Battery life is poor. The keyboard isn't brilliant. The hard drive is a relatively vulnerable component.

**Conclusion** If you need to run complex applications in the field, it's one of the most portable choices around, and Windows CE is no substitute in this respect.



#### Hewlett-Packard Jornada 820e

**Price** £849 (£723 ex VAT)

**Contact** Hewlett-Packard 0990 474747

[www.hp.com](http://www.hp.com)

**Good Points** Superb battery life. Excellent keyboard. Completely solid state.

**Bad Points** Virtually no third-party software that will run on it, as yet. Very limited storage capacity. Really sophisticated applications are beyond it.

**Conclusion** It's what many people have been waiting for as a portable word-processing and email machine, but be aware of its limitations.





▲ WHO YOU GONNA CALL?  
NEIL BARRETT IS YOUR MAN  
IF YOU SUSPECT FOUL PLAY OF  
A COMPUTER-BASED NATURE

Neil Barrett, scientist and **computer crime fighter**, is a leading expert in his field. Organisations including banks, the police, Customs & Excise and others call in Barrett to try hacking their systems or to finger a suspected hacker. Here, he helps George Cole with his enquiries.

# Hacker cracker

**N**eil Barrett spends a good part of his time hacking into computer systems, sneaking into offices, breaking open encrypted files and cracking computer passwords. But before you call the law, you should know Barrett is on the

right side of it. At just 36, he's one of Britain's leading computer crime experts and has worked with a range of organisations including the police, customs, banks, the Inland Revenue, telecomms and utilities companies, the NHS, military defence, ISPs and the NCIS (National Criminal Intelligence Service).

photograph by Nick Dawe

As one of three Fellows at Bull Information Systems, his full-time job is looking at the future development of IT (Barrett's Ph.D thesis was on complex computational modelling). "I describe myself as a computer scientist with an interest in computer crime," says Barrett. "It's really a hobby." Some hobby. In addition to his advisory role, Barrett has written many papers, two books on computer crime, and is in much demand on the lecture circuit.

So which computer crime activity makes it to number one? "Dissemination of computer viruses — and it has been for a long time," says Barrett, "The loss of money, per virus incident, is quite low. The problem is the phenomenally high number of incidents."

Insider fraud is "popular", too. It's usually carried out by employees trying to swindle their companies through a variety of scams such as creating false suppliers or contractors and channelling funds to their own accounts. Employees can also cause havoc by leaving logic bombs (electronic time bombs) which can damage a company's IT system.

Says Barrett: "For example, if an employee's work number is registered as 'sacked', the logic bomb goes off. Another is to encrypt important company files, then change the password so only they can access them."

External hacking doesn't rate highly in the computer crime league. "Over 75 percent of hacking is done by insiders and it's easy to see why. The person on the inside is on the right side of the firewall — they know the computer system and have access to the passwords," says Barrett. What lets hackers down is that they either have the computer skills but don't understand the business, or vice-versa. "What's worrying is that we're now getting people who understand computers and how businesses work."

"Pornography on the internet is not as big a problem as some sections of the press make out," claims Barrett. "There's a large number of pornographic images on the internet but not a great deal of the really nasty stuff — dead bodies, bestiality and paedophile material." He adds that there are ways of tracking child porn on the net. "We can get the signature characteristics of files containing this type of material, and if someone downloads it from a newsgroup, we can detect and follow it."

A bigger problem is the dissemination of copyright-protected material such as computer software and PC games from the internet. Barrett complains: "Suckers like me buy software from legitimate sources and end up paying for the losses companies suffer from this type of activity. It's not fashionable to say, but it's theft."

Despite the hysteria over criminals using encryption to protect their computer files, Barrett doesn't believe a Key Escrow system,

which would give law enforcement agencies access to decryption keys held by trusted third parties, is either necessary or desirable. "In all the cases I've worked on, encryption has never been a problem as we've always managed to break into the file or get hold of the key. The US ban on

## With all these skills, it's little wonder that Barrett was **ONCE OFFERED £150,000 TO STEAL** a file containing a list of high-income customers from a bank

exporting hard encryption keys is misguided and foolish because it simply allows others to undercut American business.

"Protecting your computer system is like locking a car and switching on the alarm. This will stop the 'door rattlers', but if a car thief is really determined, they'll either spend a lot of time cracking the alarm or take it away on the back of a lorry. There's also the 'Black and Decker' hack. If I put a power drill to your knee and ask you to give me the password to your computer system, the chances are you will. The point is that no computer system is completely hacker-proof, but you can go a long way making it hard to crack."

**B**arrett has a routine when he's asked to help a company to combat computer crime. It begins with a "whiteboard attack" which involves looking at the company's computer system and postulating how it could be attacked. He also considers "the route to reward". "An attack has to be cost-justified," claims Barrett. Then there's a tier analysis, which considers different levels of criminality: from schoolboy hackers to organised gangs, determining which are most likely to attack a company. "We tell the company what action to take to protect themselves, what it will cost, how they can detect it and what their response would have to be."

The second step is a dress rehearsal, showing how the existing company system can be attacked. "It may be as simple as getting hold of passwords or breaking into a web site, or sitting in a darkened room with a PC and attempting to blast open their system. It's demonstrating weaknesses," he says.

Barrett admits that some systems are too difficult to crack, while others are frighteningly easy to break into. "We once obtained some passwords by simply calling up the company and asking for them. We got an employee's name from the company directory and called in, saying that we'd lost our password. We asked for it and they told us!" On another occasion, Barrett and a colleague entered a building by sneaking in with a group of legitimate visitors. "We looked like

part of the crowd, and we could plug into the company's network and bypass the firewall."

With all these skills, it's little wonder that Barrett was once offered £150,000 to steal a file containing a list of high-income customers from a bank. "I never found out who wanted the list, but it looked as if they were planning to set up their own bank and wanted to start with a strong customer base," he recalls. Needless to say, Barrett declined the offer and informed the police, but the mystery caller had covered his tracks.

During his investigative work, Barrett uses a number of tools. The system audit log keeps an electronic record of the system's operations and is a crucial record. The DIBS(R) disk imaging system allows him to make perfect hard-disk copies without affecting the contents. Other tools can detect internet traffic and collect the packets of data for analysis. Profiling tools can tell you whether any traffic looks as though it

may be coming from a hacker, or whether someone is trying to edit an audit trail.

In the future, intelligent user-profile systems will automatically build up a picture of legitimate users by analysing the way they use the keyboard: "The way we type is as distinct as the way we sign our signature, and so a computer could detect whether it was really you using the computer," says Barrett. Smartcards will also play a bigger role in IT protection. But who is ahead of the game — the IT criminal or the law? "It's pretty even," says Barrett, "but you've got to remember that the criminal will always have a greater reason for doing it."

➔ Barrett has used this experience and other events to write a novel, *Evil dot Com*, which is currently awaiting a publisher. His two other books, *Digital Crime — Policing the Cybernation*, and *The State of the Cybernation*, are both published by Kogan Page.

## THE ELECTRONIC CRACKER

**P** psychological profiling is fast becoming a tool in crime detection. The process, made popular by the TV series, *Cracker*, uses scene-of-crime evidence to create a profile of the individual most likely to have committed the crime. Barrett was recently involved in a case where, for the first time, profiling was used in the investigation of a computer crime. A user profile was created by analysing the way in which the computer had been used. With little more than a series of time stamps and a list of commands, Barrett created a remarkably accurate profile.

The work was part of Barrett's role as a defence witness in a case resulting from a major UK paedophile investigation called Operation Starburst. Caught up in the investigation was a young university student who was found to possess dozens of floppy disks containing around 750 allegedly indecent images of children. The student was charged with possession with intent to distribute.

The evidence suggested that the student had received the images and then copied them onto floppy disks. But more proof was needed: a police error meant that important audit information had been wiped.

"The prosecution and defence had little to go on," says Barrett. The

available information consisted of the student's history file, which showed when the student used the computer, the commands he used and the times he was logged-on, plus some backup tapes. "There was some overlap between the history file and the backup tapes — we had information going back six months but no audit logs or email records."

A user profile was created by analysing the command used by the student during each computer session, and the time gap between them. The university has a Unix-based system which uses a "change directory" command followed by a "list directory" command. Some users run the commands together (typing CD;LS), others wait for the LS prompt to appear. "The gap between the two commands isn't thinking time, it's the time it takes for the system to respond," explains Barrett. The student had an internet account with a password known only to him: "He used some shortcut commands, so whenever we saw them, we knew it must be him. He also knew his way around the files, so we expected very few LS commands," says Barrett. But close examination revealed that someone else was accessing the internet account using a different pattern of commands. "This meant

the Crown couldn't show that the defendant was the only person with access to the account, thereby casting doubt on whether he had distributed any of the images."

An examination of the commands used by the mystery caller revealed someone trained on an early version of Unix. "Unix machines arrived in universities in the late seventies," explains Barrett. "There are a number of versions of Unix, each with a particular set of commands. The commands used pointed to someone trained to use Unix around 1980-1984, after which the next version was released."

"If he were a systems manager in the early eighties, he'd be aged around 40-45 today, so we were able to tell the court that we had evidence that there was a mystery caller with access to the internet account, what their age was, their job, the date they were in higher education, the type of computer system on which they learnt their skills. We even traced the workstation they'd used to access the account."

It didn't take long for the court to discover the identity of the systems manager, who fitted the electronic profile. Apparently he had been asked by the police to search the student's email account — something the police had omitted to tell the defence. A retrial was ordered.

SO MUCH CHOICE, SO LITTLE TO GO ON. **HOW DO YOU CHOOSE THE BEST ISP** TO SUIT YOUR NEEDS? JOHN LEYDON OFFERS SOME PRACTICAL ADVICE.

# Service industry

**T**hey get you to sign up when you're at college or starting work. Often they offer a plethora of free gifts and inducements. Through inertia, or being tied-in to an ever-tighter business relationship, users are disinclined to change accounts. They hope that many will ultimately use their service to set up a small business.

"They" are not banks but Internet Service Providers (ISPs). With financial institutions such as the Nationwide setting themselves up as service providers on the information superhighway, you might be forgiven for not understanding the difference.

Like banks, ISPs offer an array of accounts, and tracking their performance can be a real problem, particularly when the organisations running services to access the internet are almost as diverse as the organisations on the net itself. Groups as manifold as Tesco, Amnesty International and Burnley Football Club (who alone can anticipate loyalty) produced online service products last year.

**The market is** changing dramatically. In the wake of Demon's acquisition by Scottish Telecom, Dixons upped the ante further by launching Freeserve in September, the most prominent example of the free ISP phenomenon. And in the midst of all this change, small businesses and consumers are faced with the dilemma of which ISP to choose for their internet service. The difficulty in making a choice is compounded by the fact that frustrating experiences of using the internet, or World Wide Wait as some describe it, may not be caused by an ISP at all. Online problems can equally be down

to a lack of memory on your PC, modem speed, response times of remote web sites, power outages, or the general state of the internet as a "best-efforts method of transferring data". However, the particular ISP you choose is a key factor and will, to a considerable extent, safeguard against accidents occurring on the information superhighway.

**The difficulty for users** is that there is no easy way to make your choice. Getting information that shows the differences between ISPs is a struggle simply because of the diverse options available. For a small-business user the situation is made worse by the highly aggressive sales techniques, the "double-glazing sales approach", used by some ISPs in promoting their services.

An example of such is British Telecom's promotion of its new pay-as-you-go internet service, called Click. Telesales staff used customer-calling information to identify internet users and these people were then offered the new BT service — in flagrant violation of fair competition rules. BT admitted the practice had taken place. It placed the blame on its telesales advisors and said it would not happen again. Should the practice be repeated, the Office of Telecommunications (OfTel) has warned BT that an order might be placed against it. This is just one manifestation of the fiercely competitive nature of the ISP market.

In September, the Advertising Standards Authority (ASA) upheld a complaint against CompuServe over a national press advertisement which had made an offer at which even the worst insomniac would balk. CompuServe had launched an advertisement headlined "Want to get on the internet? Try this for starters". It claimed "FREE One month's trial. FREE 650

hours online". Six complainants objected that the advertisement was misleading because users would have to spend 27 days and two hours online in a month to take full advantage of the offer. The ASA asked CompuServe to take copy advice in future.

Faced with such a barrage of information, yet little that is definitive, it is wise to apply first principles to choosing an ISP. Getting the right connection is about matching what *you* need with the services of a provider. Consider what you want from an internet connection and what might irritate you, such as banner ads.

Contrary to popular opinion, variously sized ISPs do offer different features and levels of support. Don't get sucked in by the hype and confused by the different offerings. There is differentiation. It's not a case of one size fits all.

"If you're going to use an ISP for your business, consider a provider that specialises in the business sector in which you operate," says Keith Mitchell, executive chairman of LINX (London Internet Exchange), a non-profit partnership involving about 58 ISPs. "If you just want value for money and lots of help get [an ISP] which offers a more general service."

**Support for** web-building tools like Microsoft Front Page, and for domain registration, is a key point to consider. Other important factors to contemplate include the size of web space the ISP provides, and how many mailboxes it gives you and whether these can be customised. Does it offer roaming service support, which allows

access from other countries? Are there services to block unsolicited bulk emails (spam)? And, last but not least, are tools available to protect children against unsuitable content?

Cliff Stanford, former managing director of Demon Internet, says the key reason to choose an

## The common-sense approach to choosing an ISP is to **GET IT RIGHT FIRST TIME**, rather than after having had an unsatisfactory experience

ISP remains the quality of service it provides. Free of the bonds of extolling his own service, Stanford has some unusual advice: "People should get a service with a strong backbone, like Demon, and then get a free account on top." That's one possible approach; but for those taking their first run at the information superhighway, it's a good idea to think carefully before you choose.

The common-sense approach is to get it right first time, rather than after having had an unsatisfactory experience. Yet a survey by market research company Inteco found that most consumers' choice of an ISP was anything but a well thought out decision.

The top three factors affecting home internet subscribers' choices were free trial discs, followed by magazines, then word of mouth. The basis of people's decisions to get on to the internet was curiosity, although peer-group pressure was also an important motivating factor. Despite opting for free trials, a large number of consumers were put off by the idea of giving out their credit card

## TESTING TIME ON THE NET

**A more objective way to test** internet performance might be to use Net.Medic software, an evaluation copy of which can be downloaded free of charge from [www.wickhill.com](http://www.wickhill.com). The possible causes of poor internet performance include your PC, local servers, modem, telecoms provider, your ISP, the internet itself and the remote web site

you are visiting. Net.Medic is designed to identify the location of the bottleneck. Net.Medic Pro additionally includes diagnostic and automatic monitoring capabilities to continuously test and improve performance. The evaluation copy is very basic: it gave me a graphic of the speed of internet downloads and

instructed me that I was running out of memory. Net.Medic is a useful tool, but it is no substitute for careful analysis. Distributors Wick Hill are targeting the Net.Medic software range at IT professionals, web masters and ISPs.

► **NET.MEDIC** ANALYSES ALL THE ELEMENTS THAT COULD BE RESPONSIBLE FOR POOR NET PERFORMANCE



details, while others had experienced or heard of problems when cancelling a subscription at the end of a trial period.

For example, uninstalling Freeserve has proved to be a particular bone of contention among netizens (those who use the net). The software makes changes to various Windows defaults which can prevent other access software from working. Exasperation is compounded by widely reported difficulties in uninstalling the software. In Windows 98, because two main components of Freeserve, IE4 and Outlook Express, are integrated, complete exorcism involves editing the Windows Registry. PC owners left with despoiled desktops and inoperative software are further faced with a technical helpline charging £1 a minute.

Mark Danby, Freeserve's general manager, admitted it was not easy to uninstall FreeServe, but maintained, "That's down to Bill Gates and how IE4 is set up." A section on uninstalling Freeserve has now been added to its web site.

Paradoxically, Inteco found that although free trials were the most used route to choosing an ISP, consumers actually thought their value was minimal compared to reliability of service and overall subscription price. Heavier users found existing subscription fees reasonable and were even prepared to pay more for a faster service. The opinion of these heavier users was that faster access wouldn't really cost users more, even if the tariff were slightly higher.

"Dixons' Freeserve could be regarded as the 'mother of all free trials' and may meet with short-term success as a consequence," says Inteco researcher Adam Daum. "But ultimately it will live or die by the quality and reliability of its service. If it falls below the standards set by other ISPs and compounds this by charging for support, it will not succeed. Non-subscribers, who will need more handholding, are wary of racking up high telephone bills. Premium rate numbers ring alarm bells for these people," says Daum. "I imagine quite a few will sign up and then leave at the first sign of problems rather than pay to resolve them. The challenge for Dixons is to offer a totally reliable service — like a utility — so support doesn't become an issue."

In general, Inteco's research showed that the more cyber-savvy users are willing to try non-brand ISPs. Those who changed service provider did so mainly because of poor experiences such as slow access, engaged lines and poor helpdesks.

Less high-profile ISPs, like U-net and NetDirect, earned readers' endorsements in the PCW survey of service and reliability carried out in the October '98 issue. Looking at ratings for setup and connection, technical support, connection speed and quality of content, it was not the industry behemoths that fared best: "The clientele of NetDirect is completely

## WHAT THE PEOPLE SAY



➤ **"I used AOL first** but now I'm using Freeserve. I worked out the maths and it was free. So who am I going to pick? The connections do put you out at times. I'm not paying a penny so I've got to allow for one or two problems."

SACHIN SHAH, IT CONSULTANT, LONDON

➤ **"BBC2 did a review** of the top ten ISPs and published it on its web site. We give students that page. We've had a deal through U-net going for 12 months now, which has worked out well. We've not had many queries about the free deal. My basic advice to students is to phone ISPs."

MARTIN SIDGREAVES, SENIOR PROGRAMMER,  
UNIVERSITY OF PLYMOUTH



**'To be honest, I wouldn't spend time choosing. YOU CAN ALWAYS CLOSE AN ACCOUNT and go somewhere else'**



➤ **"I had AOL,** which had its own GUI [Graphical User Interface]. If you're interested in getting on the internet, it's not worth having. Freeserve? There must be some catch — adverts or something. Nowadays I get access with Demon, through work. We have an ISDN line and normally we don't have any problems. I want the actual internet, not GUIs. If I were to advise my friends, I'd say 'go with Demon'. Some of my friends have cable and

use it to surf between 7pm and 7am. Well, it's cheap, so I guess it's a good idea."

NICK GIBBONS, TECHNICAL SUPPORT OFFICER,  
NT SQUARED

➤ **"When I come to choose an ISP** I'll look around in magazines and ask people. I'll look at what people have to offer, especially web services. That would be my main reason to choose. I need the ability to choose web applications. The ability to support CGI scripts and programs like Microsoft Front Page is important. Demon is pretty good, but not AOL. To be honest, I wouldn't spend time choosing. You can always close an account and go somewhere else."

DR PETER SMIELEWSKI, RESEARCH ASSOCIATE, UNIVERSITY OF CAMBRIDGE



## CHECKLIST FOR CHOOSING AN ISP

Here's a list of things to consider when choosing an ISP.

- 1. Draw up a list** of what you want from the internet. Support for development tools like Microsoft Front Page, spam-blocking facilities and large web space might be high on this list.
- 2. What is the ratio** of customers to modems used by your potential ISP? Home users will probably be satisfied with a ratio of 20:1, although they may experience busy dial tones. Does your

potential ISP support the V.90 modem standard and ISDN?

- 3. Does it route internet traffic** with all major UK networks instead of going via the US (known as peering)?
- 4. Is your potential** service provider dependent on another ISP?
- 5. Is the access software** provided easy to use and install? And uninstall?
- 6. Is less than 20 percent** of the ISP's core capacity presently used?
- 7. Does its network** have a 100 percent availability record? Does it

include resilience in its network by using more than one telecommunications carrier? This is becoming rarer.

- 8. Does it guarantee** service speed across its network?
- 9. Is there** 24-hour, 365-day support?
- 10. Is its annual turnover** rate of customers less than one percent? Does anyone recommend them? At least check whether they have a web site — there are some cowboys out there.
- 11. Does it give** test log-ins to check speed and performance?

different to that of online service providers. The latter are just not geared up to deliver," said a NetDirect spokesman. "For example, we support 128Kbps ISDN at no extra cost. We also register accounts and domains."

Other service providers are differentiating themselves by enhancing the content they provide or emphasising their links to a locality or a particular profession. Yet many end-users opt to stay put with an ISP even in the face of abysmal service, primarily because there's a belief that changing ISPs is "a hassle" and that all ISPs are very similar.

**If you're a small business**, how difficult it is to change your ISP depends on the extent of the business relationship you have with that ISP and whether there are any contracts involved. If

not its software, technical support or pricing. But the use of new internet technology, web caching, casts doubt on whether these tests fulfil even this limited objective. Web caching is a technology which allows ISPs to locate frequently accessed content locally, the idea of which is to speed up end-user access to data.

**According to** caching company Mirror Image Internet, certain ISPs (which it is unwilling to name) can identify the email request from any test lab which tries to measure the performance and reliability of an ISP. Instead of downloading the material from a remote internet site, the material is downloaded from a local cache, giving the illusion of a much speedier service. The effect is like certain recording artistes making purchases at record stores which are

used for chart returns, so that the record will be perceived as popular which will, in turn, boost sales.

The difficulty of choosing an ISP is compounded by the complexity and speed of change of a nascent market. Potential internet users

must first do their homework. They can visit the web site of those ISPs under consideration and find out who are its customers. These people can be approached for a clear, objective view of what the service is really like and whether it fulfils a service provider's promise of performance, facilities support and technical support.

This is far more difficult than the "no brainer" decision of using a cover disc, but it is worthwhile since you will end up getting a service that gives you the best value for money and meets your needs. Like banks, ISPs can appear strikingly similar, but making the wrong choice will land you with an account that gives you poor rates of return. ■

**Many end-users OPT TO STAY PUT WITH AN ISP EVEN IN THE FACE OF ABYSMAL SERVICE, because there's a belief that changing ISPs is a 'hassle'**

you're simply an enthusiast, then the problem is not too serious as it would only involve notifying everyone who is likely to send you email. If you are running a small business with a web site, the problem is more serious and would involve reconfiguring your network, administration issues such as dealing with customers, and potentially legal issues.

One approach to comparing ISPs is by running tests to measure their performance in terms of speed and reliability by trying a particular, undisclosed list of sites at random intervals. This produces results highlighting the quality and the infrastructure of an ISP,

### PCW CONTACTS

Demon Internet [www.demon.net](http://www.demon.net)  
Dixons FreeServe [www.freeserve.com](http://www.freeserve.com)  
LINX [www.linx.net](http://www.linx.net)  
Wick Hill [www.wickhill.com](http://www.wickhill.com)



AS A SMALL-TO-MEDIUM SIZED BUSINESS EXPANDS, SO DOES ITS **NEED FOR NETWORKING**. DAVE MITCHELL MAKES THE LINK BETWEEN GROWTH AND COLLABORATIVE COMPUTING.

# Altogether now

**T**he past year has seen most of the big names in the IT industry turning their mighty gaze on small businesses. Hardly surprising, since the SME (Small to Medium

Enterprise) represents a huge proportion of businesses in the UK and has only recently begun to realise the potential benefits that IT has to offer. One of the key areas being focused on by the major manufacturers is networking, and many vendors have created complete product lines specifically aimed at helping the small business take its first steps on the road to collaborative computing. The key to choosing

the right products is understanding the needs of your business and its potential for expansion. Networks have a knack of growing beyond all expectations, so the hardware you buy today needs to be able to grow with your company.

The most common starting point for many small businesses is the peer-to-peer network: a small group of PCs connected over an ethernet network, sharing resources such as hard disks, CD-ROMs and locally attached printers. They'll usually have their network interface cards (NICs) connected over 10Base-2 cabling, or thin ethernet. The main advantages are the low cost of setup, as the 50-ohm co-axial cable is relatively cheap, and the PCs can be connected directly to the cable using T-connectors.

But thin ethernet does have its limitations and is consequently losing favour. The co-axial cable represents a single point of failure. If a break occurs anywhere along its length, communication between all connected PCs will be lost, and due to the lack of any status indicators, troubleshooting can be extremely difficult. Plus, the maximum cable length for a network segment is 185m, which can only support up to 30 workstations.

## Return to Base-T

The most popular form of network connection is over UTP (unshielded twisted pair) cable, commonly referred to as 10Base-T. The cable contains two pairs of twisted wires: one pair used for transmitting, the other for receiving. Each wire twist is through 180° to cancel out electromagnetic interference (EMI) while leaving the signal intact. The wire in between each twist

▼ **STACKING HUBS IS AN IDEAL EXPANSION TECHNIQUE, AS NETWORK PERFORMANCE IS UNAFFECTED**



can act as an antenna and receive noise, so cable lengths are limited to 100m. To ensure transmission quality is maintained, the signal needs to be regenerated, and this is carried out by the ubiquitous repeater, or hub.

Introducing a hub onto a network changes the topology (structure) of it. Thin ethernet creates a bus topology where the co-axial cable is laid out in a single branch with workstations connected along its length. A hub creates a star topology where the hub is the central point with all connection radiating outwards. True, the hub itself now represents a single point of failure which can affect the entire network, but hub failures are extremely rare.

To allow distances between workstations to be increased beyond 10Base-T cable segment limitations, more hubs can be connected to ports on the first hub. Called cascading or daisy-chaining, one port on each hub is used to connect the two devices together. A special cable, with the send and receive wires crossed over, may be required but most hubs have a dual-function port. It can function as a normal port, or, with the flick of a switch, become a crossover port allowing a standard straight-through cable to be used to link a second hub.

There's no limit to the number of hubs which can be in a cascade, but, as signal quality and timing cannot be maintained beyond a certain point, no two end-stations can be separated by more than four hubs or five wiring segments. This could be a potential problem to companies that have used up all available ports on their hubs and want to expand further without violating these connection rules.

The simple solution is a stackable hub. It has a special connector on the rear panel allowing its

backplane to be linked directly to another hub. When two or more are connected, they appear to the network as a single unit. It's an ideal method of expansion as you can add extra units without affecting the repeater count. For most small companies with users swapping the occasional file and using shared printers, standard 10Mbits/sec ethernet will provide all the bandwidth they need. However, the amount and variety of data being shunted around today's networks can soak this up, so the next option is Fast Ethernet. It's got the same look and feel as standard ethernet, the only difference being bit timings (the time taken for each bit of information to be transmitted). These have been reduced by a factor of ten, thus giving a ten-fold increase in performance to 100Mbits/sec.



▲ LEDs ON THE FRONT OF HUBS, SUCH AS THESE INTEL MODELS, INDICATE THE STATE OF NETWORK ACTIVITY

## The faster alternative

Fast Ethernet products are now cheap enough to be a viable alternative to standard ethernet. Dual-speed network interface cards can be had for a modest extra outlay, and many hubs, even at the small-business level, support both 10 and 100Mbits/sec connections. These use two separate internal backplanes for dealing with the different connection speeds.

Are there rules for Fast Ethernet? You bet there are. Only two repeaters can be placed

## CHEAP NETWORK HUBS



▲ **Bay Networks NetGear E104TP** (£25 ex VAT). Basic four-port 10Base-T hub. One port can be converted to crossover for hub cascading. It uses an external power supply. The E104 costs £38 (ex VAT) and is the same as the E104TP but with an extra BNC connector for

connecting to other hubs over a 10Base-2 co-axial backbone cable.

▼ **Intel InBusiness 5-port hub** (£38 ex VAT). Attractively designed five-port 10Base-T hub. Its casing allows extra hubs to be clipped together and one port can be used as a crossover for cascading.

An eight-port version (£47 ex VAT) is



also available.

► **3Com OfficeConnect Hub 8/TPC** (£75 ex VAT). This is a well-built, eight-port 10Base-T hub. There's a useful collection of status lights on the front panel and an extra BNC connector for connecting to 10Base-2 backbone. The Hub 8/TPO version has no BNC connector and costs £59 (ex VAT). Fast Ethernet hub prices start at around £105 for the



four-port OfficeConnect TP400.

• **UmaxSOHO-10H05** (£32 ex VAT). A five-port 10Base-T hub with an extra crossover port for cascading. The eight-port version (pictured, right: £49 ex VAT) also has one BNC socket for backbone connection.



between workstations and the total cable length across the entire link must be 205m. The cable grade you choose is also important. If you install a standard ethernet network and use cheap Category 3 cable, you won't be able to migrate your users to Fast Ethernet as the cable is not of a sufficiently high quality to handle the faster signals. It's far safer when specifying your wiring to choose Category 5 cable.

One of the biggest issues is maximum throughput, whether it's ethernet or Fast Ethernet. Essentially, ethernet is a connectionless service over shared media. When data is transmitted, it is sent to every other node on the network and only one packet of data can be on the wire at any one time. If two packets are transmitted simultaneously, they'll collide, so each station must back off for a specific time and then re-transmit.

Ethernet networks use a method clumsily called Carrier Sense Multiple Access/Collision Detection (CSMA/CD) to deal with the collision

problem. Unfortunately, as more data is transmitted, the likelihood of a collision occurring increases and eventually the network can reach a stage known as thrashing: there are so many colliding transmissions that no data is getting through to its destination. This usually occurs at around 80 percent utilisation of the available bandwidth.

While Fast Ethernet solves this problem by throwing more bandwidth at it, a switch is another alternative. It looks no different to a hub, but all similarity ends there. Switches contain powerful processors and memory that allow them to read and store the addresses contained in each frame's header. When a transmission occurs between two nodes, the addresses are stored in a forwarding table held in memory, allowing the switch to "remember" which physical port each node is connected to. When further frames are received, they can be switched only to the port where the destination node is located, thus reducing network traffic as

## NETWORK STARTER KITS

**Y**ou've decided to get your office PCs connected but don't want the hassle of buying the network components separately. Why not go for a complete network starter kit? Aimed at the SoHo (small office/home office) market, these provide all the necessary components to get your first network up and running with the minimum of fuss, and offer good value. Here we look at three different kits.

➔ **The OfficeConnect starter kit from 3Com** costs £81 (ex VAT) and contains all you need to get two or more PCs networked. It comes with a brace of 10Base-T network cards, a four-port hub and two generous 7.6m lengths of Category 5 UTP cable. One of the ports doubles as a crossover port, so if you want to cascade further hubs you'll lose one of the four-ports. Remember the ethernet four-repeater rule,

so your network will be limited to supporting 12 end-stations if you only use four-port hubs. If that's enough, you'll find this kit easy to set up thanks to the superb documentation. The ISA NICs look slightly dated considering everything's moving over to PCI, but they can easily handle the demands of a standard ethernet network.

➔ **Check out Accton's Network Starter Kit** if you want to bypass standard ethernet completely by choosing a Fast Ethernet-only solution. For £129 (ex VAT) you get a couple of PCI dual-speed network cards, a four-port Fast Ethernet hub and two 4.5m Category 5 UTP cables. The Accton CheetahHub Power-3004D hub has a small slide-on baseplate allowing it to be mounted just about anywhere. Plenty of status lights show you what each connected

workstation or server is up to, plus a couple of bandwidth utilisation lights. The network cards have driver support for DOS, Windows 3.x, Windows 95/98 and Windows NT, and there's a comprehensive instruction sheet. The main points to remember with this kit are that you won't be able to connect any standard 10Mbps/sec ethernet products to the hub as it is not dual-speed, and Fast Ethernet rules dictate that only one more hub can be cascaded, so this starter kit limits you to a maximum of eight ports. You can, however, cascade

using a larger hub with more than four ports.

➔ **RingDale's starter kit** offers a similar package to Accton's (p142). Its starter kit includes a couple of Novell dual-speed NICs, two Category 5 cables and a four-port Fast Ethernet hub. At around £399 (ex VAT) it's comparatively expensive but you also get a Fast Ethernet print server. This little box of tricks allows you to connect any printer to the network as it has a parallel port at one end and a network port at the other.



transmissions are not being propagated across the entire network. The switch creates a virtual connection between the sending and receiving addresses, and segments the network into smaller collision domains. Implementing a switch doesn't mean your hubs have to go, as they can be linked directly to the switch ports. Performance will be boosted because the groups of users connected to each hub will now receive a dedicated 10 or 100Mbps/sec pipeline.

## Small-business selection

When purchasing your network hub or switch, you'll find a huge range of products at competitive prices. For the small office there are network kits and we've reviewed three of them in the panel "Network Starter Kits" on page 140.

➔ **Check out Bay Networks' NetGear** range of products if you want to network a small business or home office and are looking for a hub with more than four ports. For £35 (ex VAT) you can get an **EN106TP** six-port hub or risk just £40 (ex VAT) for the **EN108TP** eight-port version. Either way you'll get a basic 10Base-T hub sheathed in a solid metal shell, with a lifetime warranty. Each port has status lights so you can see at a glance if there are any problems, and a dual-function port allows you to cascade.

**What type of networking technology you choose should be determined by your TYPE OF BUSINESS AND USER REQUIREMENTS. The golden rule is to plan carefully**

➔ **Compaq can help**, if you want the best of both worlds, with its latest **HB3120** dual-speed hub. For £240 (ex VAT) you get eight autosensing ports that run at either 10 or 100Mbps/sec, depending on the connection the hub detects. The front panel provides plenty of LED-based diagnostic information, along with individual port status and operating speed. The HB3120 stacks a maximum of six units so you can go up to 48 ports without affecting the repeater count. You could add an **HB3220** for £300 (ex VAT), which uses an internal switch to link the 10 and 100Mbps/sec backplanes in the entire stack for full dual-speed switching.

➔ **Accton has always had** a strong presence in the small-business networking market and its latest **CheetaHub Power-3524A** has a few tricks to make it stand out from the crowd. In its most basic form it's a 24-port dual-speed stackable hub costing a reasonable £559 (ex VAT). One dual-function port allows you to cascade another hub, or you can stack up to six CheetaHubs together using the rear backplane connectors for a massive 144 ports, without increasing the repeater count. A wide array of

status lights keeps you in touch with the action and shows the speed at which each port is operating. Two expansion slots on the front panel allow a variety of modules to be added. The most interesting is the **EM-3560** module. Slot this in, and your dual-speed stackable hub is transformed into a switch for an extra £169 (ex VAT). The module has its own on-board processor and enough memory to store up to 4,096 different network addresses.

➔ **InBusiness hubs and switches represent Intel's move**, last year, into the small-business market. You can move straight into 10Mbps/sec ethernet switching for £250 (ex VAT) with the eight-port **Switch Plus**, a diminutive plastic box with eight switched 10Base-T ports at the rear. More units can be slotted together to form a physical stack but connection is via an additional crossover port, and extra units will increase the repeater count. Two more dual-speed ports allow the Switch Plus to be connected to another Fast Ethernet hub or you can use them to provide a fast pipeline to network servers.

➔ **SMC's TigerSwitch 6724** is at the high end of the switch market. At £1,275 (ex VAT) it seems expensive but comes as standard with 24 dual-speed, auto-sensing ports and has enough internal memory to automatically read and store 8,000 network addresses. You can link a serial

cable to a connector on the front panel and use a terminal emulation session on a PC to view and modify switch settings and monitor performance.

Alternatively, by assigning an IP address to the TigerSwitch, it can be managed from a workstation anywhere on the same network using a standard web browser.

What type of networking technology and equipment you choose should be determined clearly by your type of business and user requirements. The golden rule with networking is to plan carefully before taking that first step. With solid foundations in place, you can expand your network as demand grows. Get it right, and your business will benefit from increased productivity and reduced costs.

## PCW CONTACTS

3Com 0800 225252 [www.3com.co.uk](http://www.3com.co.uk)  
 Accton 01344 418810 [www.accton.com](http://www.accton.com)  
 Bay Networks (NetGear) 0171 571 5120  
[www.baynetworks.com](http://www.baynetworks.com)  
 Compaq 0845 270 4000 [www.compaq.com](http://www.compaq.com)  
 Intel 0870 607 2439 [www.support.intel.com](http://www.support.intel.com)  
 Ringdale 0800 214503 [www.ringdale.com](http://www.ringdale.com)  
 SMC 01344 418800 [www.smc.com](http://www.smc.com)  
 Umax (IMC Distribution) 01344 871344  
[www.imcnet.com](http://www.imcnet.com)



# Making their mark

The phenomenal rate of change in the inkjet-printer market has prompted us to present this **round-up of the latest models.**

**T**he only thing that seems to change as quickly as computer technology is printer technology. Drop-sizes continue on their downward trend towards invisibility, making photos more believable; faster engines churn out pages at an ever greater rate of knots; and improvements in the chemical make-up of the inks that you put into your printer, do their best to make feathering a thing of the past.

PCW recognises the need to keep on top of changes in the market and so this month we take another look at inkjet printers, putting them through the same rigorous tests to which they are submitted in our annual group test, to see what's new, what's hot, and what fails to impress.

While our summer group test split

the range into budget, A3, photo and office printers, the only stipulations, this time around was that the printers should use A4 as their standard paper size. This attracted a wide range of contenders. Some incorporated USB ports, others allowed us to connect only via the more conventional parallel interface. While most used conventional manufacturer-specific drivers, one opted instead for an implementation of PCL5 and PostScript Level 2.

Although prices also varied widely, this should not be taken as an indication of the speed or quality you can expect from the printers tested here. So, if you're looking to buy a new companion for your PC and want the lowdown on the market's new contenders, we have everything you need to know.

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• *Printers tested and reviewed by  
Nik Rawlinson*

## Canon BJC-7000



This large parallel printer holds two oversized cartridges, one black, one colour (or photo) CMY. On our review model, unless almost an inch of paper stock was loaded into the feeder, it would report that there was none in the printer. Canon claims this printer can reproduce photos “indistinguishable from the originals”, and although using the photo cartridge on photo paper at the finest-quality

setting did produce good results, it was easy to see that the originator had been an inkjet printer. Colours were realistic but the pixels were easy to spot, especially in lighter areas. Printing the same photo with the colour cartridge was a no-go option. Stepping was clearly evident in the fades of our business graphics, even with Canon’s coated paper and at the finest of the five possible quality settings.

**Text was very impressive** on this same setting, although it took 23 minutes 32 seconds to produce five pages. At the Middle quality setting,

the characters were visibly feathered, while in the fastest mode they were reduced to a watery grey.

### PCW DETAILS



**Price** £269.08 (£229 ex VAT)  
**Contact** Canon 0121 666 6262  
[www.canon.co.uk](http://www.canon.co.uk)

**Good Points** Ink refills, not just replacement heads.

**Bad Points** Photo reproduction didn’t live up to its promise. Problems with paper feeder.

**Conclusion** Disappointing.

## Epson Stylus Color 740



The Color 740 uses the same two-cartridge CMYK piezo technology as the Color 850. If we allowed the installation CD to “autorun” and install from the menu, the printer was unable to detect paper in its input tray. Parallel connection was supplemented by a USB port. Adobe PhotoDeluxe 2.0 was bundled. The driver offers the same colour adjustment options as the 850,

adding controls to engage ICM (international colour matching) and sRGB (sustained red green blue) presets for colour matching. We ran our test text in Economy (120dpi), Normal (360dpi) and Photo (1440dpi) settings. While the highest setting produced clean, crisp output, it was at a speed of only five pages in 27min 10sec. At a page every 11 seconds the draft output was very disappointing, while the Normal setting resulted in feathering on plain paper. On coated paper the colours of our business graphics were vibrant and solid, arriving in 9min 19sec at the highest-

quality setting, while on photo paper our photograph was reproduced without a flaw at an impressive 10min 33sec.



### PCW DETAILS



**Price** £272.60 (£232 ex VAT)  
**Contact** Epson 0800 220546  
[www.epson.co.uk](http://www.epson.co.uk)

**Good Points** USB option. Photo reproduction.

**Bad Points** Install problems. Poor economy quality.

**Conclusion** Versatile.

## Epson Stylus Color 850



The Epson Color 850 and 740 use piezo crystals to “vibrate” the ink from the nozzles. The 850 needs no power adapter, taking undiluted power from the mains. The range of paper available to the driver varies depending on which of the four quality settings is selected. Colour adjustment for brightness, contrast, saturation and individual CMY channel intensity is

possible. The on-screen “time remaining” countdown fluctuates wildly and proved to be inaccurate in our tests. At all quality settings, various levels of feathering on text was visible on photocopy paper, although changing the paper stock for coated paper, even if retaining the Normal quality setting, improved this dramatically. A one-page business letter produced multiple times averaged out at 13sec (Economy), 13sec (Normal) and 2min 32sec (Superfine) per page. Business-graphics output on coated paper could not be faulted. Colours were vibrant, fades were smooth and a reverse hairline

drawn through solid black was easily reproduced. On Epson’s photo paper our A4 photograph arrived in just 5min 17sec, with realistic colours and excellent skin tones.

### PCW DETAILS



**Price** £318.43 (£271 ex VAT)  
**Contact** Epson 0800 220546  
[www.epson.co.uk](http://www.epson.co.uk)

**Good Points** Photo reproduction.

**Bad Points** High-quality text is slow. Inaccurate countdown timer.

**Conclusion** Great for photos.

## HP DeskJet 710C



The 710 incorporates a quick-release door to free jammed paper and links to the PC using a standard parallel cable. A wake-up on data function means that printing to it on its "off" state will turn it on. It can handle six paper types, including transparency film. With a maximum resolution of 600dpi, this unit incorporates ColorSmart and ICM technology to ensure realistic colours. The Econofast setting was good enough for final copies of text documents.

At 1min 10sec for five word-processed pages it was faster than many of its contemporaries, and this time rose to only 1min 45sec and 1min 50sec for five pages in Normal and Best settings respectively. The graduated fills in our business graphics were some of the smoothest we have seen, although on both photocopy and inkjet paper the reverse hairline running through a block of black ink was difficult to see. On inkjet paper our colours were vivid, solid and true. The Best quality setting delivered this A4 page of business graphics from CorelDraw in 8min 11sec, but selecting Normal slashed this

to 2min 18sec. Skin tones were faithfully reproduced and composite black did not seep into lighter areas.

### PCW DETAILS



**Price** £210.33 (£179 ex VAT)

**Contact** Hewlett-Packard  
0990 474747 [www.hp.co.uk](http://www.hp.co.uk)

**Good Points** Fast. Easy install. Standby data wake-up. Paper-jam door.

**Bad Points** Minor improvements could be made.

**Conclusion** A neat complement to the home PC.

## HP DeskJet 895CXi



Like the Epson Stylus Color 740, this printer incorporates a USB connection. The two-cartridge CMYK heads are brought to the middle of the carriage for easy access whenever the lid is lifted. An easy-access door in the back makes clearing paper jams easy, and a wake-up feature prompts you to turn the printer on before printing. Thirteen paper types can be selected, and users can choose between ICM and manually adjustable ColorSmart, HP's technology that

analyses and automatically adjusts the image to provide what it believes to be the best colour balance. Multiple pages can be printed on a single sheet, or enlarged to print across a number of pages to be tiled. Output quality was excellent. Even at the Econofast setting (four text pages in 44sec) the standard was impressive. At Best quality, the same five immaculate pages arrived in just 2min 6sec. Business graphics were handled well. On HP's Premium Inkjet Paper and at the Best quality setting, colours were vibrant and realistic. Graduated fades were smooth and Pantone blocks were handled well.

Our photo output was excellent, with well reproduced skin tones on HP's own photo paper taking just 7min 32sec to arrive at Best quality.



### PCW DETAILS



**Price** £292.58 (£249 ex VAT)

**Contact** Hewlett-Packard  
0990 474747 [www.hp.co.uk](http://www.hp.co.uk)

**Good Points** Print quality. USB option.

**Bad Points** None to speak of.

**Conclusion** A great all-round printer.

## HP DeskJet 2000C



An extra paper tray and HP's JetDirect 300X unit, a print server for 10/100Base-TX environments, turns the 2000C into a network printer aimed firmly at the business market. Those considering an inkjet as their main network printer should consider the cost implications. Ink is more expensive than toner, and the coated paper preferred by these machines is more expensive than standard photocopy paper. With Econofast (draft) quality

to match the best rival output, it produced five text pages in just 43sec. Rising to 1min 9sec and 1min 36sec for Normal and Best quality settings respectively, characters were well defined with sharp edges, even on photocopy paper. Although nothing special on photocopy paper, using HP's inkjet paper gave impressive results in the business graphics test with some of the best graduated fades we have seen. Colours were bold and pure, and the four Pantone test blocks were solid. It even managed to complete the very difficult test of running a white hairline through a black block. On the photo

test the colours were good, but on HP's photo paper the results were heavily banded.

### PCW DETAILS



**Price** £705.00 (£600 ex VAT)

**Contact** Hewlett-Packard  
0990 474747 [www.hp.co.uk](http://www.hp.co.uk)

**Good Points** Fast, versatile, expandable.

**Bad Points** Poor photo handling on photo paper.

**Conclusion** Great for the office, but maybe not for the home user.

## Lexmark 3200



**T**he 3200 is a four-colour (CMYK), two-cartridge printer. Installation was easy and the interface was a standard parallel connection, although no cable was supplied.

With no output tray, the completed pages are deposited on a plastic pier resting on the desk. The driver is fairly versatile, allowing the more adventurous user to tweak the brightness, contrast and saturation of the image, or the strength of the individual red, green and blue

channels — useful when printing photos. Output was generally impressive. Draft text (600dpi) was slightly grey and lined, but both High (1200dpi) and Normal quality (600dpi) were a solid black. Higher-quality settings sacrificed speed, with a 20sec draft page rising to 28sec at normal and 1min 43sec at High quality. Lexmark claims 6ppm mono, although in the Draft setting this printer took 1min 40sec to produce only five copies of a standard single-page business letter. Solid colours in our business graphics looked rich and vibrant on coated paper, although it failed to print

a grey 50% black: the result was instead a deep chocolate brown. Although the test photo was faintly lined, this minor imperfection was visible only upon very close inspection.

### PCW DETAILS



**Price** £176.25 (£150 ex VAT)  
**Contact** Lexmark 01628 481500  
[www.lexmark.co.uk](http://www.lexmark.co.uk)

**Good Points** *Inexpensive. Good High and Normal quality.*

**Bad Points** *No output tray.*

**Conclusion** *A good printer for the light user.*

## Lexmark OptraColor 40



**R**ather than employing a proprietary driver standard, Lexmark has opted to give the choice of either PCL5c or PostScript

Level 2. However, this does restrict the user to 600x600dpi output (1200dpi through image smoothing).

We were unable to complete our photo-printing test with the standard 4Mb memory and had to upgrade to 12Mb before the OptraColor 40 was able to produce a complete page. This

is a major deficiency in what Lexmark maintains could be used as a network printer, although connection is via the standard parallel interface. Further, even after cleaning the heads and trying a variety of print media, the photo results were obstinately banded and induced a massive 7min 39sec spool time. When receiving a page of text, this printer's 8sec spooling time was a little slow. However, on photocopy paper the ink demonstrated uniform density and clean edges with only the minimum of feathering. Five pages arrived in just 1min 50sec. On Lexmark's inkjet paper business-graphic presentation was

impressive. Fades were smooth, and colours were bright and solid. On both inkjet and photocopy paper it had no difficulty in producing a hairline of white through a block of solid black.

### PCW DETAILS



**Price** £434.75 (£370 ex VAT)  
**Contact** Lexmark 01628 481500  
[www.lexmark.co.uk](http://www.lexmark.co.uk)

**Good Points** *Industry-standard drivers.*

**Bad Points** *Inadequate memory. Poor photo reproduction.*

**Conclusion** *Rather expensive for what you get.*

## How printers utilise USB

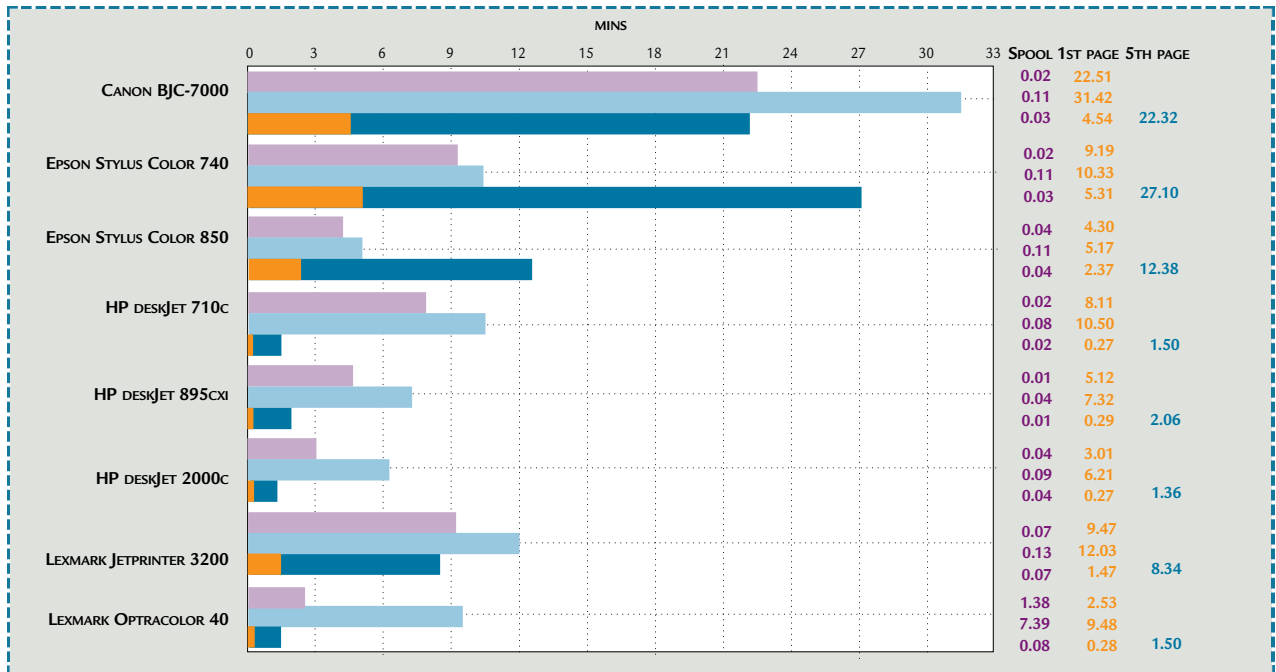
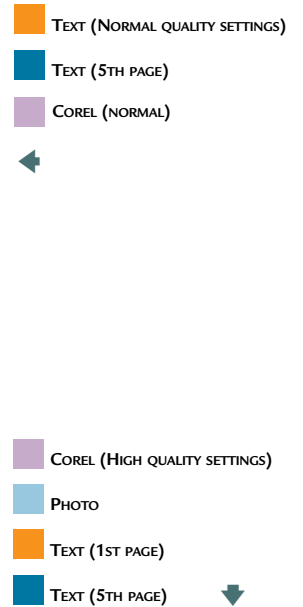
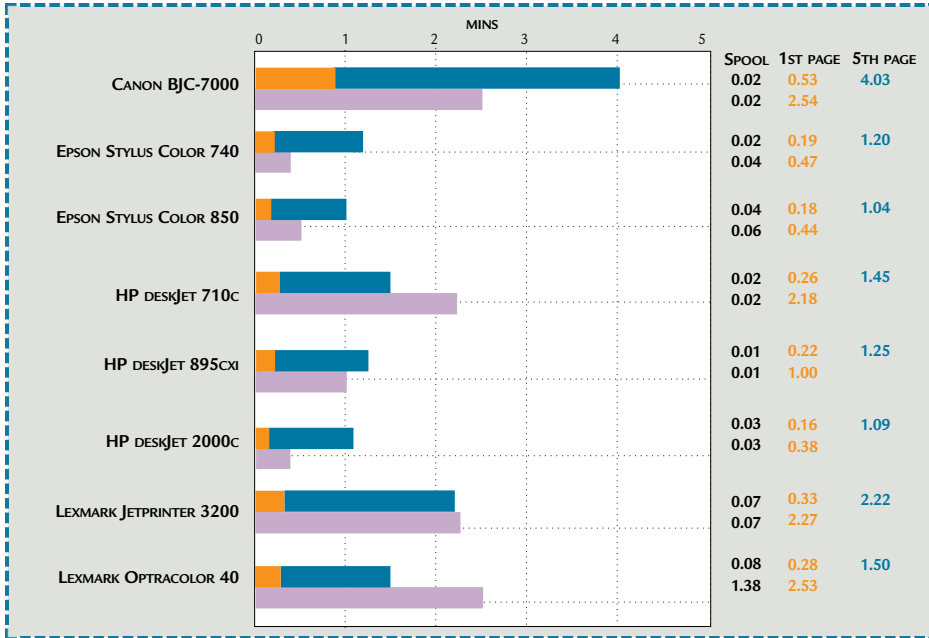
**T**wo of the printers that appear in this round-up of inkjets, Hewlett-Packard's DeskJet 895CXi and Epson's Stylus Color 740, incorporate USB and are the first two printers we have seen to incorporate the technology.

Hewlett-Packard manufactures a parallel-to-USB adapter for existing printers, but the benefit of using a printer with the technology built in means that it leaves the parallel port free for any devices without a pass-through connector, or for use in computers such as the Apple iMac that do not include a parallel port. While this has not yet found its way onto the PC, the more widespread adoption of USB means that we may see it replacing serial and parallel connections entirely in the future.


USB driver support is built in to Windows 98, and carrying data at 12 megabits per second it is suitable for non-speed-critical applications such as printers and digital cameras; not hard drives, though. USB connections allow a bi-directional data flow, so that the printer can pass information back to the PC as well as accepting data to print. Such information could include the state of the ink wells or paper-jam warnings.

Perhaps the most significant aspect of the USB interface to tempt the printer user is the ability to connect multiple peripherals to a single port and hence do away with clumsy switcher boxes. In this way, the home user will be able to connect perhaps a laser and a colour inkjet to a single PC and direct specific jobs to each at will.





## How we did the tests

 To test the speed of the printers' engines, they were first asked to print a standard business letter containing a variety of fonts and font sizes, as well as a scanned signature. As this represented a realistic use of the machine and required paper coverage of more than 5%, it highlighted the difference between manufacturers' claims and the actual performance of their products.

We also wanted to test the printers' colour-printing capabilities and so devised two further tests. The first was a page of business graphics produced in CorelDraw. Incorporating fades, solid blocks, the PCW logo and even four Pantone blocks, it pushed each printer's rendering capabilities to the limit. This we printed on both photocopy and coated paper to measure the versatility of its inks. Our business graphics test examines bleeding of ink, and the

solidity and uniform density of colour in areas of extended paper coverage. To test the number of distinguishable levels of tone possible, four faded bars in black, cyan, magenta and yellow fade from 100% coverage to 0%. Visible stepping indicates fewer levels and possibly lower quality. Finally, a thin white hairline is drawn through a block of solid black to check for accuracy and feathering.

The final test was to reproduce a full-page A4 photo incorporating a montage of green, blue, red and yellow images. The yellow image was surrounded by composite black to test bleeding, while a band of swimmers running into the ocean tested each printer's ability to produce realistic skin tones — a particularly difficult task.

➡ Many thanks to PhotoDisc <[www.photodisc.com](http://www.photodisc.com)> who supplied the photographic images used in the tests.

PHOTO AND TEXT SAMPLES



Canon BJC-7000



Epson Stylus Color 740



Epson Stylus Color 850



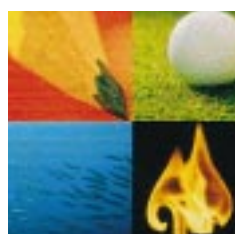
HP DeskJet 710C



HP DeskJet 895CXi



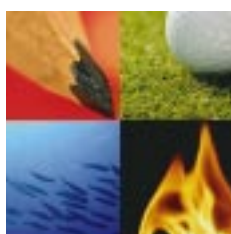
HP DeskJet 2000C



Lexmark 3200



Lexmark OptraColor 40



Control

bitmap, printed from Photoshop as an indication of print speed for  
Canon BJC-7000

Photoshop or Paintshop Pro. The speed for an A4 page with 100%  
Epson Stylus Color 740

Photoshop or Paintshop Pro. The speed for an A4 page with 100%  
Epson Stylus Color 850

bitmap, printed from Photoshop as an indication of print speed for  
HP DeskJet 710C

bitmap, printed from Photoshop as an indication of print speed for  
HP DeskJet 895CXi

bitmap, printed from Photoshop as an indication of print speed for  
HP DeskJet 2000C

Photoshop or Paintshop Pro. The speed for an A4 page with 100%  
Lexmark 3200

Photoshop or Paintshop Pro. The speed for an A4 page with 100%  
Lexmark OptraColor 40

CORELDRAW SAMPLES



Canon BJC-7000



HP DeskJet 710C



Lexmark 3200



Epson Stylus Color 740



HP DeskJet 895CXi



Lexmark OptraColor 40



Epson Stylus Color 850



HP DeskJet 2000C



Control

Table of features



MANUFACTURER	CANON	EPSON	EPSON	HEWLETT-PACKARD
MODEL	BJC-7000	STYLUS COLOR 740	STYLUS COLOR 850	DESKJET 710C
Price (ex VAT)	£229	£232	£271.00	£179
Telephone	0121 666 6262	0800 220546	0800 220546	0990 474747
Web site	www.canon.co.uk	www.epson.co.uk	www.epson.co.uk	www.hp.com
Maximum resolution (dpi)	1200 x 600	1440 x 720	1440 x 720	600
Input paper tray capacity	130 sheets	100 sheets	100 sheets	100 sheets
Bundled software	None	Adobe PhotoDeluxe 2	None	None
Cost of mono cartridge ex VAT	£29.99	£17.50	£17.69	£21.80
Cost of colour cartridge ex VAT	£31.99	£17.50	£18.10	£26.60



MANUFACTURER	HEWLETT-PACKARD	HEWLETT-PACKARD	LEXMARK	LEXMARK
MODEL	DESKJET 895CXi	DESKJET 2000C	JETPRINTER 3200	OPTRACOLOR 40
Price (ex VAT)	£249	£600	£150	£370
Telephone	0990 474747	0990 474747	01628 481500	01628 481500
Web site	www.hp.com	www.hp.com	www.lexmark.co.uk	www.lexmark.co.uk
Maximum resolution (dpi)	600	600	1200 x 1200	600 x 600
Input paper tray capacity	100 sheets	150 sheets	100 sheets	150 sheets
Bundled software	None	None	Windows Draw 6	None
Cost of mono cartridge ex VAT	£21.80	£26.60	£18.52	£22.37
Cost of colour cartridge ex VAT	£26.60	£26.60	£22.37	£24.93

# Editor's Choice

Speed and **quality of output** is all the proof we need.

The speed of the printers reviewed here varied widely, as did the quality of the output they produced. Judging which should be awarded the prestigious *PCW* Editor's Choice award therefore involved identifying the optimum balance between these two factors. Further, while for some users price may be a secondary consideration, for a great number it may feature more highly in the list of factors that influence their choice.

The cheapest of the crop reviewed here is the Lexmark JetPrinter 3200, attaining a very respectable 1200 x 1200 dpi resolution, squeezing over 1.4 million dots into each square inch of paper. Although this ensures more or less continuous tonal coverage with smooth transitions between colours and shades, it should be remembered that at much more than 150dpi the human eye finds it difficult to spot the individual dots.

Epson's Stylus Color 850 and Stylus Color 740 undoubtedly produced the best photo reproduction with a top resolution of 1440 x 720 each. Although with colours, tones and saturation to match the original article when printed on photo paper, their ponderous approach to text let them down.

The 740 was faster than its competitors at the Draft quality setting, but this was not of high enough quality to be used for official documents. The high-quality modes of both Epson printers produced pleasing text output, but they lagged behind the Hewlett-Packard units in terms of job time.

The **Epson Stylus Color 740** has a slight edge over its larger sibling in the inclusion of a USB port, and so for its photo performance receives our **Highly Commended** accolade.

The average user would be hard pressed to find fault with the quality and speed of the Econofast mode employed by the **Hewlett-Packard 895Cxi**. Although it is slower in Normal quality modes than the two Epson offerings, we feel that the fact you could happily use Econofast for vital documents puts it strides ahead. Like Epson's 740, it gives the user the option of a USB connection. The fact that the



▲ **OUR EDITOR'S CHOICE, THE HEWLETT-PACKARD 895Cxi. OVERALL, WE FOUND IT HARD TO FAULT IT**

▶ **THE EPSON STYLUS COLOR 740, WITH ITS IMPRESSIVE PHOTO REPRODUCTION, IS HIGHLY COMMENDED**

HP printers numbered among those with the lowest resolution should not be held against them: HP uses its own PhotoREt technology which allows the printers to place up to 16 individual drops of ink onto each spot, eliminating the need to increase resolution to eliminate white areas while still making lighter tones possible. Although not quite up to the standard of Epson's offerings, the CXi's photo and business

graphics reproduction were impressive when the speed at which they were produced was taken into account. The range of paper with which it can cope would be difficult to better, and the open-cover sensor, dragging the cartridges to a serviceable position, make replacing the ink a breeze. We found it difficult to fault this machine and so award it our coveted **Editor's Choice**.

£499 BUDGET SYSTEMS >>

# group test



# The best for less

**How much does a top-notch PC system with all the trimmings cost? Thousands? No. £499 is nearer the mark. Here's ten top budget contenders for serious bargain-hunters to consider.**

**F**ancy a 333MHz Pentium II processor? How about 64Mb of 100MHz SDRAM to go with it? How about watching DVD films on your PC's DVD-ROM drive, or playing games using the superb Millennium G200 graphics card from Matrox? If I said you could get all this kit in a PC for £499 ex VAT, what would you say?

**Ever attentive** to the needs of our readers, we have come up with the ideal solution for affordable computing. With prices in freefall, we thought the £499 price tag still seemed one of those outer limits that it was unwise to approach. How wrong we were. Our latest (and cheapest) round-up shows how easy it really is to get top-notch kit for very few pounds.

**But it's not just consumers** who might think twice about buying a PC at that price: we talked to a few computer manufacturers which declined our invitation to supply such a cheap PC, despite advertising budget PC systems. At that price, companies are relying on selling in volume before they can think about making money, and some are hesitant about their presence in the budget market.

What our group test undoubtedly shows is that following the incredible drop in the price of computing, you can now get your hands on a PC with a configuration that would have been considered high-end until a few months ago. What follows is a pretty good argument for buying a £499 PC before manufacturers come to their senses...

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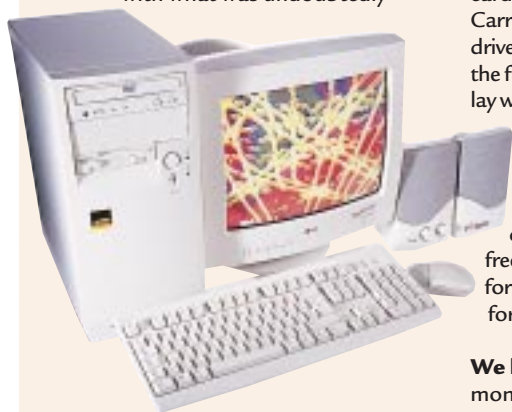
• Systems tested and reviewed by Paul Trueman

Illustration by David Whyte

## Carrera Capricorn

Carrera is one of the few British manufacturers that sells both direct and over the counter, and its PC prices stay competitive despite the added overheads of selling retail.

**Carrera sent us** a PC with the AMD K6-2 processor for this test, utilising a 100MHz Super Socket 7 motherboard. We assumed the reason for having just 32Mb of RAM was because the money had been spent elsewhere. In fact, the system designers at Carrera had come up with what was undoubtedly



one of the most interesting machines in this group. They had installed the LG DRD-820B DVD-ROM drive rather than a cheaper CD-ROM drive, and Zoran Soft-DVD software. The new DVD-enabled 8Mb Diamond SpeedStar AGP card shared the decoding work with the processor but the results were nevertheless jerky, with far too many dropped frames for the film to be watchable.

**The SpeedStar** is a new graphics card just out on the market, and Carrera assured us that the finalised drivers from Diamond would iron out the frame-rate problems. The problem lay with incompatibility between the Zoran software communicating with the DVD-enabled card. Sound was provided by the VideoLogic SonicStorm PCI card, and this left both ISA slots free if you wanted to buy a modem for internet access, plus one free slot for a PCI card.

**We liked** the 14in LG StudioWorks monitor included with the

Capricorn. The picture was pin-sharp in all four corners of the monitor at a resolution of 800x600, and while there was slight blurring with a 1024x768 display, it is inadvisable to set a 14in monitor at this resolution anyway.

### PCW DETAILS

**Price** £586.33 (£499 ex VAT)

**Contact** Carrera 0171430 0486  
[www.carrera.co.uk](http://www.carrera.co.uk)

**Good Points** DVD drive for future-proofing.

**Bad Points** Not your bag if DVD doesn't interest you.

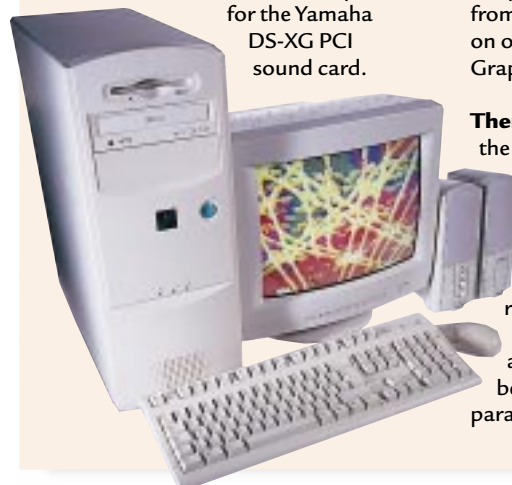
**Conclusion** An ambitious, highly individual machine, ultimately flawed by budget constraints.

<b>Build Quality</b>	★★
<b>Performance</b>	★★★★
<b>Value for Money</b>	★★★★
<b>Overall Rating</b>	★★★★

## Dotlink Magnum Entro 200

Dotlink is a rapidly expanding company with a reputation at PCW for submitting good all-round machines. The PC it sent in for this group test eschewed power for completeness, and while it might not be the fastest PC ever, it has a lot to commend it.

**Internet access** won't be a problem with the 56K modem installed in one of the three ISA slots, and Dotlink opted for the Yamaha DS-XG PCI sound card.



The Magnum was the only PC in this group without an AGP card, instead using ATI's PCI 3D Charger which isn't the best card you could hope for. It uses ATI's venerable Rage II chip, and it has only 2Mb of RAM on the card rather than the 4Mb that is now standard. However, Dotlink had still used a relatively expensive motherboard, with a spare AGP slot: if a keen gamer wants to upgrade in the future, they can always purchase a top-notch AGP card and benefit from the higher data transfer rates on offer from the Accelerated Graphics Port.

**There is an** obvious trade-off in the Magnum Entro between components such as the speedy modem and the PCI sound card, and the processing power. The WinChip C6 from IDT is a respectable budget processor option, but its 200MHz looked a little weedy next to some of the beefy 333MHz K6-2 processors paraded in the other PCs here.

**Dotlink chose** an unbranded 14in monitor to companion the system, with 13.2in viewable area. This afforded a pretty awful picture at 1024x768 resolution with a maximum 60Hz refresh rate. Even at 800x600 there was colour bleeding at the sides of the picture, although it was much sharper.

### PCW DETAILS

**Price** £586.33 (£499 ex VAT)

**Contact** Dotlink 0181 200 9933  
[www.dotlink.co.uk](http://www.dotlink.co.uk)

**Good Points** All the components you need in a multimedia PC.

**Bad Points** Ageing PCI card means that you can't expect top 3D graphics performance.

**Conclusion** A decent all-round PC.

<b>Build Quality</b>	★★★★
<b>Performance</b>	★★
<b>Value for Money</b>	★★★★
<b>Overall Rating</b>	★★★★

## Elonex MCX333

**E**lonex submitted a squat but well-built PC based around a Celeron processor. The original incarnation of the Celeron, crippled by its lack of L2 cache, has been abandoned by OEMs in favour of the new version, codenamed Mendocino. Its 128Kb of L2 cache is on-die (on the same piece of silicon) and runs at the same core speed as the processor. Because the L2 cache on a PII isn't on-die, it runs at half the clock speed of the processor, which is one of the reasons why Mendocino/PII

performance is comparable in floating-point operations. The front-bus bandwidth, which connects the CPU with the system memory, is still only 66MHz, as this is the fastest speed supported by the LX chipset in this machine. Neither does this chipset support processors running faster than 333MHz, so the LX cuts off a potential upgrade path to a PII 350 or higher. Elonex kitted out its PC with the Celeron 300A, the "A" denoting the Mendocino version. If Elonex wants to upgrade RAM from the 48Mb currently supplied with the MCX333, it will need to dump at least one of the DIMMs too, because there aren't any free RAM slots — both are filled.

**On the plus side**, the LX chipset does accommodate an AGP slot and Elonex filled it with the V3000ZX card from Asus. The Asus card uses the impressive Riva 128ZX chip with 8Mb of SGRAM. Both ISA slots were left free, and one of the two PCI slots was filled with a 56K modem using the near-ubiquitous Rockwell chip.



**Elonex branded** the monitor with its own badge, a 15in model with a decent OSD controlled from underneath the screen. It was capable of a 70Hz refresh rate at 1024x768, although at this resolution the image lost some of its sharpness.

### PCW DETAILS

**Price** £586.33 (£499 ex VAT)  
**Contact** Elonex 0181 452 2444  
[www.elonex.co.uk](http://www.elonex.co.uk)

**Good Points** A generous amount of video memory for a budget machine.

**Bad Points** LX rather than BX chipset limits upgradeability.

**Conclusion** A well-built machine with decent kit.

<b>Build Quality</b>	★★★★
<b>Performance</b>	★★★★
<b>Value for Money</b>	★★★★
<b>Overall Rating</b>	★★★

## Hi-Grade Winputer PV

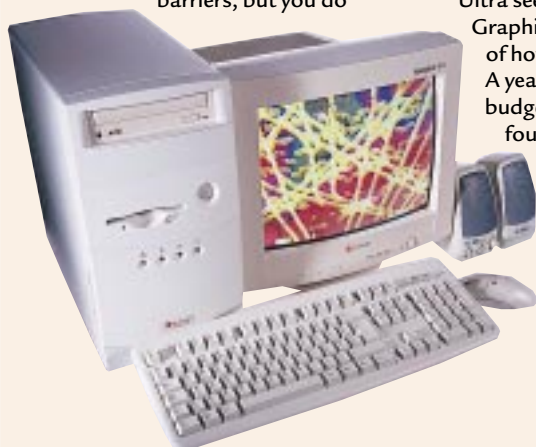
**H**i-Grade has submitted excellent, affordable PCs to our group tests in the past, and is another company which has only recently begun to address the new budget market. Hi-Grade has recently rebranded its main range of PCs, now calling them Winputers. While they might be the standard beige, the smoothed-out edges of the new case are a welcome move.

The Winputer might not be about to break any processing speed barriers, but you do

get a good all-round package for your dosh. Under the hood is an IBM 8x86 MII processor clocked at 300MHz, partnering the 32Mb of SDRAM held on one of two DIMM slots. The Fujitsu hard drive isn't really a contender: its 3.2Gb isn't going to last long when up to 1.5Gb can be swallowed up just installing a game.

Similarly, when we received so many graphics cards holding 8Mb of memory, the 4Mb CirrusLogic 3D Ultra seemed a little under-powered. Graphics cards are another example of how quickly the market moves. A year ago 2Mb was the norm in budget machines; now, cards with four times that much memory are commonplace.

**A 56K modem** had been installed, as well as an ESS sound card, leaving a single ISA and a PCI slot free. Most machines in this group had either a sound card or a modem; few had both.



**Hi-Grade featured** its own brand of monitor with the Winputer, the 14in AlphaScan 411. While it couldn't produce a healthy refresh rate at 1024x768, the picture was sharper than most. It didn't have an OSD but its manual controls were pleasantly user friendly.

### PCW DETAILS

**Price** £586.33 (£499 ex VAT)  
**Contact** Hi-Grade 0181 532 6100  
[www.higrade.com](http://www.higrade.com)

**Good Points** Both sound card and 56k modem.

**Bad Points** Not a massive hard drive or RAM.

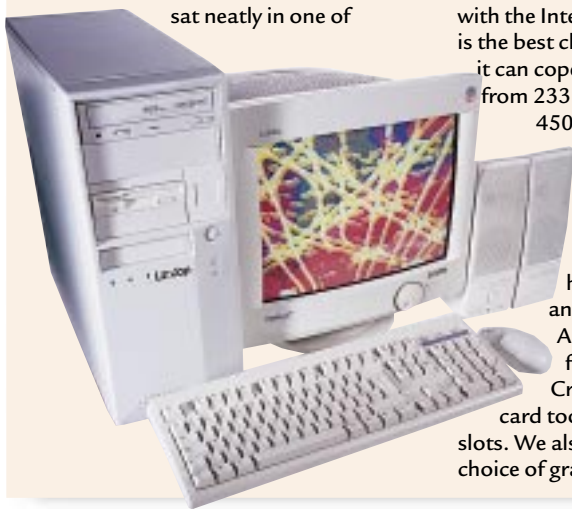
**Conclusion** A well-balanced PC.

<b>Build Quality</b>	★★
<b>Performance</b>	★★★★
<b>Value for Money</b>	★★★★
<b>Overall Rating</b>	★★★



## Lexon Entra 333

**L**exon supplied us with a very impressive machine for this group test, proving irrefutably that it is possible to get your hands on attractive kit even at budget prices. Celeron 333, hefty RAM and an excellent graphics card made the Entra an undoubted front-runner. Our attention was first taken by the generous amount of system memory the Entra 333 had been endowed with: its 64Mb of SDRAM sat neatly in one of



three DIMM slots. Lexon had opted for the new Mendocino version of Intel's 333MHz Celeron processor. This has 128Kb of Level 2 cache sitting on the die itself and running at the core processor speed, as opposed to the PII where the L2 cache runs at only half the core speed of the processor.

**We were also impressed** that Lexon had chosen a motherboard with the Intel BX chipset. This is the best chipset because it can cope with any PII processor from 233MHz to the latest 450MHz and supports 100MHz RAM, so you have a clear upgrade path if you wish to invest at a later date. The motherboard had one spare ISA slot and two free PCI slots. A 56K Rockwell modem filled one ISA slot, and a Creative Labs PCI64 sound card took up one of the PCI slots. We also appreciated Lexon's choice of graphics card, the

Millennium G200, Matrox's powerful and popular 2D/3D card with 8Mb of SGRAM as standard.

**Lexon hadn't stinted** on the monitor brand either. The 15in Mag Innovision XJ350 had excellent OSD and a sharp picture across its 13.8in viewable screen.



### PCW DETAILS

**Price** £586.33 (£499 ex VAT)

**Contact** Lexon 0181 532 6100

[www.lexonpc.com](http://www.lexonpc.com)

**Good Points** Generous hard drive, excellent graphics card, lots of RAM.

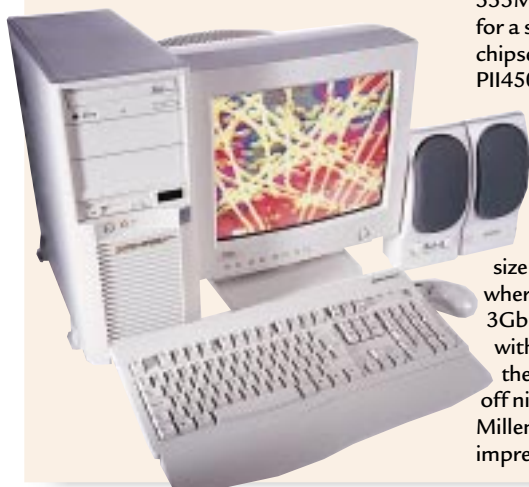
**Bad Points** None worth mentioning at this price.

**Conclusion** Buy one before they change their minds.

<b>Build Quality</b>	★★★★
<b>Performance</b>	★★★★
<b>Value for Money</b>	★★★★★
<b>Overall Rating</b>	★★★★★

## Panrix Micro 333

**P**anrix usually sends us fast, affordable machines for review, so we were keen to see if its budget PC would perform with the customary zip. No worries: the Micro 333 didn't let us — or Panrix — down. Panrix was one of the companies which went the prescribed Intel route when choosing a processor, with the Mendocino Celeron 333. When purchasing a PC, users should



ensure, if they are being sold a Celeron, that it is the Mendocino generation. With 128Kb of on-die L2 cache, it is considerably faster than the previous first-generation of cacheless, toothless Celerons.

**Upgradeability** is a key factor in the design of this PC, and Panrix scored Brownie points for its use of the KB-6130 motherboard built around the BX chipset. Despite the fact that the 333MHz processor is nearly a match for a similar-speed Pentium II, the BX chipset allows for an upgrade to a PII450MHz if you wish. Together with the 333MHz processor there was 64Mb SDRAM packed on to a single DIMM, leaving another two DIMMs free for system-memory expansion. Panrix hadn't stinted on the size of the hard drive either, and where some manufacturers used 3Gb units, Panrix trumped them with a generous 5.1Gb. Rounding the package of major components off nicely was the Matrox Millennium G200 graphics card, impressive on either 2D or 3D apps.

**The bundled CTX monitor** was impressively clear and sharp even at 1024x768 resolution, and the OSD was user-friendly and thorough. Although there was slight loss of focus in the corners of the screen, the refresh rate was a healthy 70Hz at 1024x768.



### PCW DETAILS

**Price** £587.50 (£500 ex VAT)

**Contact** Panrix 01132 444958

[www.panrix.com](http://www.panrix.com)

**Good Points** Excellent components, powerful processor.

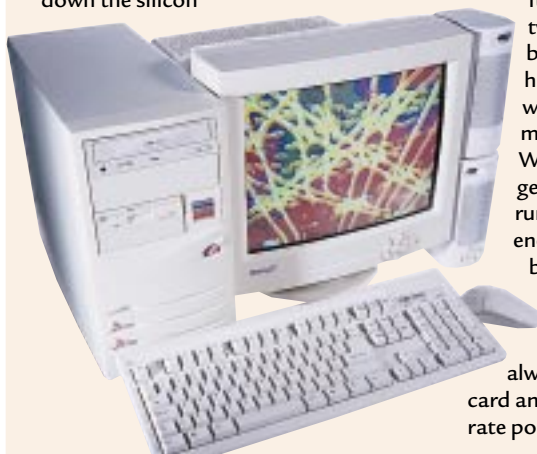
**Bad Points** You sacrifice a modem for power.

**Conclusion** An impressive PC.

<b>Build Quality</b>	★★★★
<b>Performance</b>	★★★★
<b>Value for Money</b>	★★★★
<b>Overall Rating</b>	★★★★

## Protek UltraMX

The UltraMX was the last of the group to be reviewed, and until we opened it up, we had given up all hope of seeing a Pentium II. After all, the Celeron is Intel's budget processor solution. Isn't it? Nevertheless, we were very impressed to find the 333MHz, the first of the Deschutes generation of Pentium II, in the UltraMX. The 333MHz was the first PII processor to be manufactured using the new 0.25 micron process, slimming down the silicon



wafer size from 0.35 microns, shortening the distances electrons have to travel across the silicon, speeding up CPU processes, and reducing power consumption.

**It is to Protek's credit** that it complemented the PII with 64Mb of PC100 SDRAM, allowed to run at 100MHz by the BX chipset. We were half expecting to find corners being cut in the RAM department to allow for the PII, but 64Mb should ensure future-proofing for a year or two at least. Protek had also budgeted for a decent 4.3Gb hard drive from Samsung, and we were amazed to find a 56K modem *as well as* a sound card. While the ATi 3D Charger is getting on a bit now, it should run your 2D/3D apps well enough, especially as it is backed up by a PII333 and 64Mb of SDRAM running at 100MHz. Still, committed gamers could always splash out on a PCI 3Dfx card and have themselves a first-rate polygon-monster.



**After such generosity** with the system, you might have expected an unbranded 14in monitor. But no: Protek provided the 15in D510 Mag Innovision. Pin-sharp at 800x600, it afforded decent focus and good refresh rates at 1024x768.

### PCW DETAILS

**Price** £586.33 (£499 ex VAT)

**Contact** Protek 01884 822300

[www.protek-europe.com](http://www.protek-europe.com)

**Good Points** PII, 64Mb SDRAM, BX chipset.

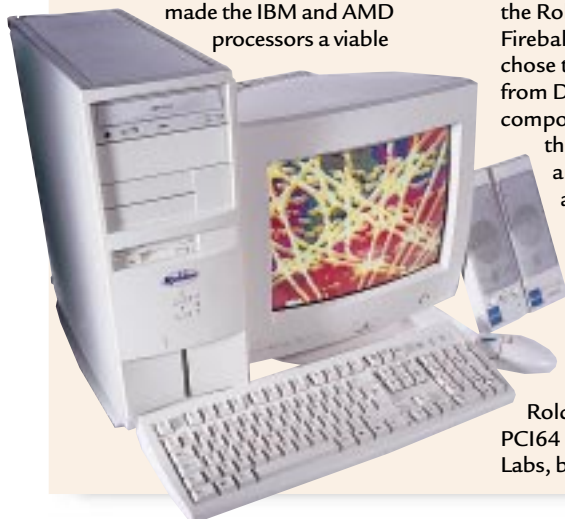
**Bad Points** *There aren't any at this price.*

**Conclusion** *A super package.*

<b>Build Quality</b>	★★★★
<b>Performance</b>	★★★★
<b>Value for Money</b>	★★★★★
<b>Overall Rating</b>	★★★★★

## Roldec Puma

As well as the budget Intel processors, we were expecting to see a couple of rival processors in this group test. Roldec duly obliged, opting for AMD's latest-generation K6-2 3D Now! that, despite its bombastic title, is giving a few Intel executives sleepless nights. Presumably because of the budget constraints, Roldec had opted for the 300MHz model rather than the faster 333MHz processor. What has really made the IBM and AMD processors a viable



alternative are the new Super Socket 7 motherboards that can cope with the 100MHz front-side bus on the processors, meaning that PC100 system RAM can run at 100MHz rather than the slower 66MHz of the original Socket 7 boards, thereby giving a boost to performance.

**All 64Mb of the SDRAM** was on one DIMM, leaving the other two free for future upgradeability, and the Roldec had a generous Quantum Fireball 5.1Gb hard drive. Roldec chose the SpeedStar graphics card from Diamond, one choice of component that suffered because of the budget. The SpeedStar uses an S3 Virge chip that's getting a little long in the tooth now, and the 8Mb of SGRAM can't really disguise the fact that while it is a perfectly respectable 2D card, it doesn't cope too well with the latest generation of polygon-heavy 3D games. Roldec included the impressive PCI164 sound card from Creative Labs, but at the expense of a modem.

**The Puma was bundled** with a 14in ADI Provista E33 monitor. When we tried to view a resolution of 1024x768, the monitor couldn't produce a picture. This turned out not to be a problem with the PC, as it hooked up at 1024x768 to a different monitor with no trouble.

### PCW DETAILS

**Price** £587.50 (£500 ex VAT)

**Contact** Roldec 01902 456464

[www.roldec.com](http://www.roldec.com)

**Good Points** *Generous RAM and hard drive.*

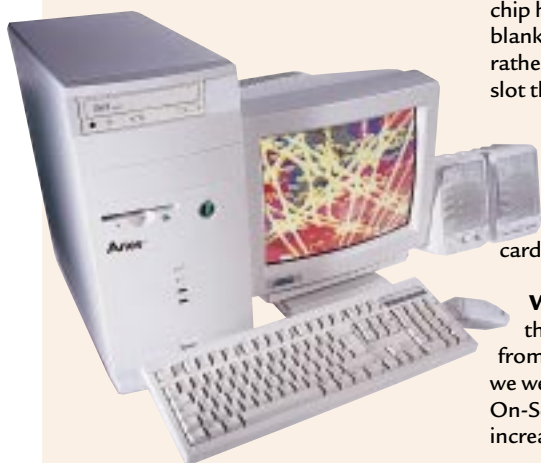
**Bad Points** *Poor monitor performance, no modem.*

**Conclusion** *A sensible configuration, but it lacks essential components.*

<b>Build Quality</b>	★★★★
<b>Performance</b>	★★★
<b>Value for Money</b>	★★★
<b>Overall Rating</b>	★★★

## Watford Electronics Aries 3200

**W**atford has redesigned its system cases, and now, as well as the Aries trademark insignia, there is also a rather chunky large, green power button on the front of the case. We were impressed at the range of Intel-free computers in this group test: Watford had based its system around the Crix MII processor running at 300MHz. Complementing the processor was 32Mb of SDRAM and a Fujitsu Ultra hard drive with 3.2Gb capacity.



**If the Aries 3200** wasn't going to win any points for raw power, one might have expected a wider array of components — a modem, for example. The system designers have used the small AT motherboard rather than the larger ATX design. Despite there being onboard sound courtesy of the ESS OPL3 chip, there were no sound sockets built on to the motherboard.

**Connections** from the onboard chip have been added to a spare blanking plate above the AGP card, rather than lower down, taking up a slot that a future PCI/ISA card might occupy. But while the hardware wasn't particularly spectacular, there was a generous selection of "edutainment" CD-ROMs and a decent AGP graphics card in the shape of the ATi Rage II.

**Watford Electronics** bundled the Spectrum Series 5 monitor from AOC with the Aries, and we weren't overly impressed. On-Screen Displays are becoming increasingly popular, but the

Spectrum had a set of finicky manual controls. Even at 800x600 there was blurring of the focus around the corners of the screen, and the colour bled away from the vertical edges.

### PCW DETAILS

**Price** £586.33 (£499 ex VAT)

**Contact** Watford Electronics  
01582 745577

[www.watford.co.uk](http://www.watford.co.uk)

**Good Points** Good software bundle, free card slots.

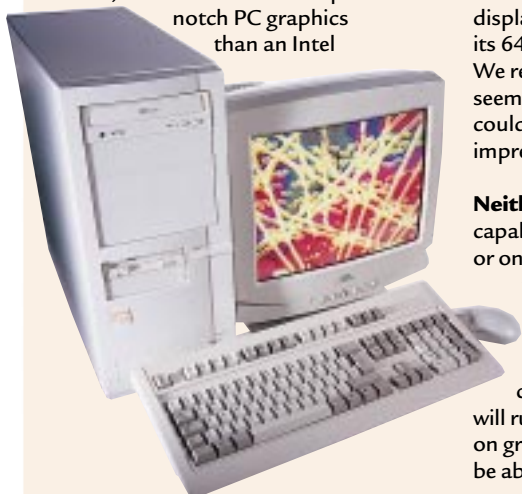
**Bad Points** Tiny motherboard, large box.

**Conclusion** A sound, if unspectacular, system.

<b>Build Quality</b>	★★★★
<b>Performance</b>	★★★★
<b>Value for Money</b>	★★★★
<b>Overall Rating</b>	★★★★

## West One Stingray

**W**est One submitted a powerful PC, although it was rather limited in terms of components. There was 64Mb of SDRAM (fast becoming industry standard) and AMD's powerful new K6-2 processor running at 333MHz. This is a powerful combination, as it is not simply the processor that is essential to top performance. Despite the groovy Pentium II adverts, there is far more to top-notch PC graphics than an Intel



bunny and a chunky black box: bags of system memory and a good graphics card are just as important as the CPU. It was with the latter component that we found fault on this PC, though, as the Diamond Stealth II AGP card wasn't properly set up when we first switched it on. Although Windows knew it was running a Diamond Stealth II card using the G460 chip, the drivers weren't working properly so the display was unable to change from its 640x480 resolution in 16 colours. We re-installed the drivers and this seemed to fix the problem, as we could then properly assess the impressive Stealth card.

**Neither a modem** nor sound capability is included, either as a card or onboard. However, capacity-wise the Stingray does offer a decent proposition, with a respectable 4.3Gb Maxtor Diamond hard drive. And that's it as far as components go. The Stingray will run your applications like they're on greased rails; just don't expect to be able to hear them. That said, at

£500 for the whole bundle, upgrading to sound and internet capability is certainly an option.

**West One included** the 15in AV2 monitor from Shinho. It presented an impressively thorough OSD and offered an excellent 85Hz vertical refresh rate at 1024x768 resolution.

### PCW DETAILS

**Price** £586.33 (£499 ex VAT)

**Contact** West One 0171 878 1800

[www.west-one.co.uk](http://www.west-one.co.uk)

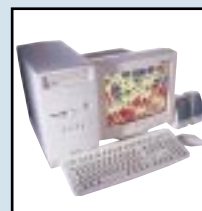
**Good Points** Quick processor, plenty of RAM.

**Bad Points** Problems with the display and drivers.

**Conclusion** A fast machine that might need extra cash spent on it for full multimedia capability.

<b>Build Quality</b>	★★★★
<b>Performance</b>	★★★★
<b>Value for Money</b>	★★★★
<b>Overall Rating</b>	★★★★

## Table of features



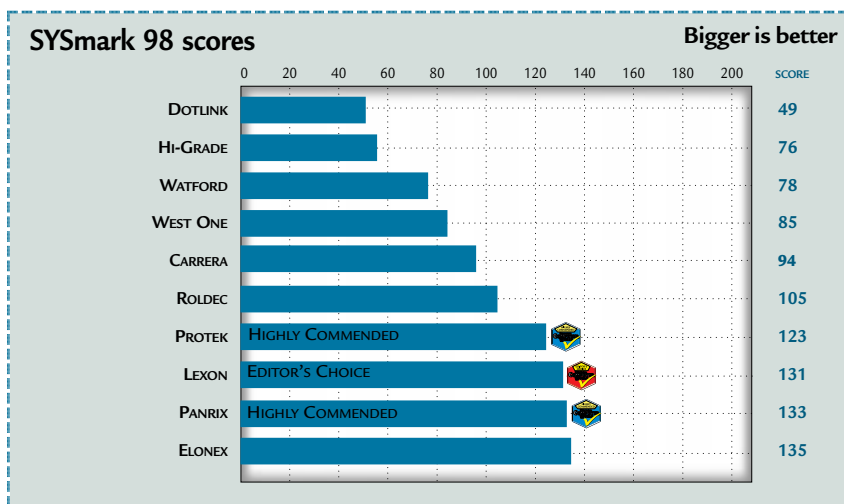
MANUFACTURER	CARRERA TECHNOLOGY	DOTLINK	ELONEX	HI-GRADE COMPUTERS	LEXON TECHNOLOGY
<b>MODEL NAME</b>	<b>CAPRICORN</b>	<b>MAGNUM ENTRO</b>	<b>MCX-333</b>	<b>WINPUTER PV</b>	<b>LEXON ENTRA 333</b>
Price (exc VAT)	£499	£499	£499	£499	£499
Price (inc VAT)	£586.33	£586.33	£586.33	£586.33	£586.33
Telephone	0171 430 0486	0181 902 5802	0181 452 2444	0181 532 6100	0181 667 1173
Fax	0171 299 6600	0181 903 6508	0181 452 7444	0181 532 6101	0181 667 1134
Web Address	www.carrera.co.uk	www.dotlink.co.uk	www.elonex.co.uk	www.higrade.com	www.lexonpc.com
Standard Warranty	3yrs RTB	3yrs RTB	1yr RTB	1yr onsite	2 yrs RTB
Warranty Options	Options up to 5 yrs	x	Upgradeable to 5 yrs	3yrs onsite	1st yr onsite £25.00 2nd yr £50.00
Technical Support	0171 430 0386	0181 795 3883	0181 452 6666	0181 532 6199	0181 680 6816
<b>HARDWARE SPEC</b>					
Processor	AMD K6-2 300MHz	IDT Winchip C6 200	Intel Celeron 300A	IBM II 300	Intel Celeron 300A
RAM / RAM type	32Mb / SDRAM	32Mb / SDRAM	48Mb / SDRAM	32Mb / SDRAM	64Mb / SDRAM
Hard Disk	Quantum	Seagate	Seagate	Fujitsu UDMA	Seagate Medalist
Size(Gb)/Interface	3.2Gb / UDMA	3.2Gb / UDMA	3.2Gb / UDMA	3.2Gb / UDMA	4.3GB / UDMA
<b>M/BOARD COMPONENTS</b>					
M/board Manufacturer	QDI Advance	Microstar	Elonex	Chaintech	Abit
M/board Model/Chipset	PSMVP3 / Via VT82C	MS5169 / Aladdin	LXMicroATX / LX	ALI M1541 / 1543	BX6 / 440BX
L2 Cache	512Kb	512Kb	128Kb	512Kb	128Kb
<b>EXPANSION AND I/O</b>					
Spare Bays 3.5"/5.25"	0/1	2/1	1/1	1/1	1/1
AGP Slot	✓	✓	✓	✓	✓
PCI Slots/ISA slots/Shared	1/1/2	2/1/1	1/1/1	2/2/1	4/3/1
USB/Serial/Parallel/PS2	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/1
<b>MULTIMEDIA</b>					
CD-ROM	LG DRD 820B IDE	Goldstar CRDA332B	Yamaha	Teac	Creative CD323le
CD-ROM Speed/Interface	24X / EIDE	32X / EIDE	32X / IDE	24X / IDE	32 X / IDE UDMA
Sound Card Manufacturer	Sonic Storm	Yamaha	Creative Labs	ESS Audio	Creative Labs
Sound Card Model	Storm PCI	PCI Waveforce	SoundBlaster PCI64	1869	SoundBlaster PCI64
Speakers	ACS90	Yamaha M7	Creative Labs CSW20	Labtec	CSW20
<b>GRAPHICS &amp; MONITOR</b>					
Graphics Card	Diamond SpeedStar A70	ATI 3D Charger PCI	Asus RivaZX	Cirrus Logic 3D Ultra	Matrox Millennium G200
RAM/Max RAM/Type	8Mb / 8Mb / SGRAM	2Mb / 2Mb / EDORAM	8Mb / 8Mb / SGRAM	4Mb / 4Mb / SGRAM	8Mb / 16Mb / SDRAM
Monitor / Size	LG 44i / 14in	Hansol E14BL / 14in	Elonex / 15in	Sampo / 14in	MAG XJ530 / 15in
Refresh Rate - 1024x768	70Hz	60Hz	70Hz	60Hz	85Hz
<b>BUNDLED EXTRAS</b>					
Modem Speed (Kbps)	x	56K	56K	x	56K
Other Extras	x	Claranet ISP s/w	x	x	x
Office Suite	x	Lotus SmartSuite 97	x	x	Lotus SmartSuite 97
Other Software	x	IBM WorldBook	x	x	Supervice
		Encyclopedia			

## Table of features



MANUFACTURER	PANRIX	PROTEK	ROLDEC SYSTEMS PLC	WATFORD ELECTRONICS	WEST ONE CONSULTANTS
<b>MODEL NAME</b>	<b>PANRIX MICRO333</b>	<b>ULTRAMX</b>	<b>ROLDEC PUMA</b>	<b>ARIES 3200</b>	<b>STINGRAY</b>
Price (exc VAT)	£500	£499	£500	£499	£499
Price (inc VAT)	£587.50	£586.33	£587.50	£586.33	£586.33
Telephone	01132 444958	01884 822300	01902 456464	01582 745577	0171 878 1800
Fax	01132 444962	01884 822301	01902 452592	0870 729 5648	0171 734 2559
Web Address	www.panrix.com	www.protek-europe.com	www.roldec.com	www.watford.co.uk	www.west-one.co.uk
Standard Warranty	1yr RTB	5yrs RTB	5yrs RTB	5yrs RTB	3yrs RTB
Warranty Options	Upgrade to onsite	Various options	1-3yrs onsite	Upgrade to onsite	Various options
Technical Support	01132 444948	01884 822302	01902 451551	0870 729 5500	0181 560 5063
<b>HARDWARE SPEC</b>					
Processor	Intel Celeron 333	Intel Pentium II 333MHz	AMD K6-2 300MHz	Cyrix M2-300MHz	AMD K6-2 333MHz
RAM / RAM Type	64Mb / SDRAM	64Mb / SDRAM	64Mb / SDRAM	32Mb / SDRAM	64Mb / SDRAM
Hard Disk	Quantum Fireball	Samsung	Quantum Fireball	Fujitsu Ultra	Maxtor Diamond
Size(Gb)/Interface	5.1Gb / UDMA	4.3Gb / EIDE	5.1Gb / UDMA	3.2Gb / UDMA	4.3Gb / IDE
<b>MOTHERBOARD COMPONENTS</b>					
M/board Manufacturer	Fic	PC Chips	EliteGroup	Gigabyte TX	Microstar
M/board Model/Chipset	KB-6130 / BX	MB-729 / BX	P5VP	GA-586TX 3 / TX	MSS169 / Aladdin
L2 Cache	128Kb	512Kb	512Kb	512Kb	512Kb
<b>EXPANSION AND I/O</b>					
Spare bays 3.5"/5.25"	1/2	1/1	2/1	2/2	1/3
AGP Slot	✓	✓	✓	✓	✓
PCI Slots/ISA Slots/Shared	2/1/01	3/2/00	2/4/01	3/3/01	4/3/01
USB/Serial/Parallel/PS2	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/1	2/2/1/2
<b>MULTIMEDIA</b>					
CD-ROM	Asus CDS360	Samsung SCR-3231E	Samsung SCR-3230	Artec	Goldstar
CD-ROM Speed/Interface	36X / EIDE	32X / EIDE	32X / EIDE	36X / IDE	32X / IDE
Sound Card Manufacturer	Yamaha	CMI	Creative Labs	Aries	-
Sound Card Model	OPL3 onboard	CMI-8330	SoundBlaster64 PCI	3D	-
Speakers	Arowana	MS691 80W	Arowana	Aries	-
<b>GRAPHICS &amp; MONITOR</b>					
Graphics Card	Matrox Millennium G200	ATI 3D Charger AGP	Diamond SpeedStar	ATI 3D Rage II 4Mb	Diamond Stealth II
RAM/Max RAM/Type	8Mb / 16Mb / SGRAM	4Mb / 4Mb / SGRAM	8Mb / 8Mb / SGRAM	4Mb / 4Mb / SGRAM	8Mb / 8Mb / SGRAM
Monitor / Size	CTX / 15in	Mag D510 / 15in	ADI Provista E33 / 14in	AOC / 14in	Shinho / 15in
Refresh Rate - 1024x768	70Hz	75Hz	85Hz (800x600)	75Hz	85Hz
<b>BUNDLED EXTRAS</b>					
Modem Speed (Kbps)	x	56K	x	x	x
Other Extras	x	x	x	x	
Office Suite	x	x	x	Lotus SmartSuite	x
Other Software	x	x	x	Comptons Multimedia	
				Encyclopedia 1999,	
				World Atlas,	
				Genius of Edison,	
				Cookbook &	
				Reference Collection	

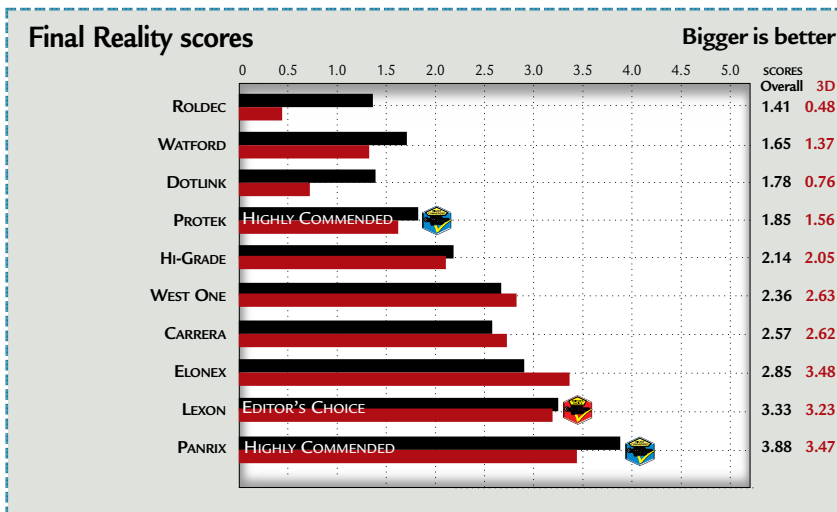
# PCW Labs Report



In the Intel vs the World debate, it would appear that the microprocessor giant has the upper hand — at least in our group test. The top four scores were all achieved by Intel-powered machines, three Celerons and a Pentium II. Surprisingly, the Elonex was the office apps winner, despite having less RAM than the other three Intel PCs, and a 300MHz processor rather than the 333MHz of the Panrix, for example. This could be because the graphics card in the Elonex outperformed the cards in the other PCs, but there wasn't much between the four scores. The AMD, IDT and 6x86 processors brought up the rear.

While the SYSmark test gives a score that reflects the performance of several components in the computer, Final Reality focuses on the graphics card. This is reflected in the scores: while the Protek has the most powerful processor, the PII, it has the older ATi 3D Charger running in tandem. While the 3D Charger is a decent graphics card, it can't compete with the latest generation of purpose-designed 2D/3D cards like the Matrox series using the G200 chip. It's no surprise that the two best results were scored by PCs with the Matrox Millennium G200 card. Panrix has once again produced a fast machine.

■ Overall score ■ 3D score



## How we did the tests

We ran two sets of tests on the PCs in this group test: **Final Reality** to test graphics capabilities, and **SYSmark 98** to test the speed of the machines when running 2D office applications.

➔ **The SYSmark test** measures the speed of the PC running 14 common office and content creation applications and the time it takes to perform a variety of tasks in each application. Each test is run three times to ensure consistent results. The applications are divided into two categories:

➔ **Office productivity:** Corel CorelDraw 8, Microsoft Excel 97, Dragon Systems NaturallySpeaking 2.02, Netscape Communicator 4.05 Standard Edition, Caere OmniPage Pro 8.0, Corel Paradox 8, Microsoft PowerPoint 97 and Word 97.

➔ **Content Creation:** MetaCreations Bryce 2, Avid Elastic Reality 3.1, Macromedia Extreme 3D 2, Adobe Photoshop 4.0.1, Adobe Premiere 4.2, and Xing Technology XingMPEG Encoder 2.1.

The number of tests run, and the type of applications used in this benchmark, ensures that all PCs are pushed to the limit, and that even those machines with very powerful processors are given a thorough work-out. Performance depends on processor speed, RAM, graphics card and disk I/O. As the tests are based on widely available software packages, SYSmark scores accurately reflect how the machine will perform in a real-world situation.

➔ **Final Reality** is a suite of tests designed to gauge the processing power of the 3D accelerator on your graphics card, 2D image processing and AGP. It runs under Windows 95/98 and DirectX 5, and uses a 3D engine developed by Remedy. It supports Direct3D and looks at how the graphics accelerator handles the kind of data it would have to process when you are playing a game. The visual appearance factors are weighted in importance and combined with the overall processing speed to produce an overall mark.

# Editor's Choice

You'd better believe it: there's some **very impressive kit** to be had for very little money.

**W**e were honestly bowled over by some of the machines we received for this group test, half of the PCW team disbelieving, the other half amazed that £499 would be all it would cost to replace the ancient boxes sitting on their own desks. Leafing through previous copies of PCW, we saw that for nearly £900 a year ago you might have got 32Mb, an S3 Virge graphics card, P166MMX and a 33.6K modem. If you shopped around.

There really has never been a better time to buy a PC. But it may not last, with some dire predictions of component drought in Q3 1999 as a result of the Asian meltdown. So get out there and get yourself a fantastic bargain now, before PC prices start to climb.

**What surprised us** in this group test was the diversity of configuration we received. Group tests can be a horror to write, as machine after machine reveals exactly the same components and monitors. This time around we had the whole nine yards as far as processors and components were concerned, from the mighty PII to the lowly IDT Winchip C6. Goodness knows what Intel's pricing strategy is, when you can get your hands on a same-speed Celeron and a PII in otherwise similar configurations and sell them at the same price.

Before we get to the glittering prizes, it's time to pat some of the contenders on the back for their gallant efforts. Elonex and Dotlink produced well thought-out PCs aimed at families who need the PC to perform in a number of roles, from homework research tool to gamestation. Similarly, Carrera, with its DVD-ROM machine, the Capricorn, earned our admiration for being the only company that ventured to do something different.

**When it came to** the awards though, the three PCs picked themselves. The hard part was picking an Editor's Choice from the trio, as all are well worth consideration. The **Panrix Micro333** is **Highly Commended**. With its generous 5.1Gb hard drive and impressive Matrox Millennium G200 graphics card, it's a great buy for anyone. Also **Highly**

**Commended** is the **Protek UltraMX**, which almost stole the show with its CPU, a PII333. We have seen machines in group tests before, where manufacturers have obviously overspent on the processor and then had to cut corners on everything else. This obviously did not happen with the UltraMX, with its 56K modem, sound card and hefty 64Mb of 100MHz SDRAM.

But this month's **Editor's Choice** goes to **Lexon** for its superb **Entra 333**. A Celeron 333 and masses of RAM is combined with quality kit.

The excellent Matrox Millennium G200 card was confirmation that Lexon wasn't about to compromise on graphics, and the Creative Labs 64 PCI card showed that the company held sound in the same high regard.

Topping off this impressive package was a 56K modem using the Rockwell chip, for internet access. There's no higher praise I can give than to say that, if you had told me a few weeks ago that I could buy this system for £499, I wouldn't have believed you.

► PICTURED, FROM TOP: THE LEXON ENTRA 333, THE PANRIX MICRO333 AND THE PROTEK ULTRAMX



LASER PRINTERS >>

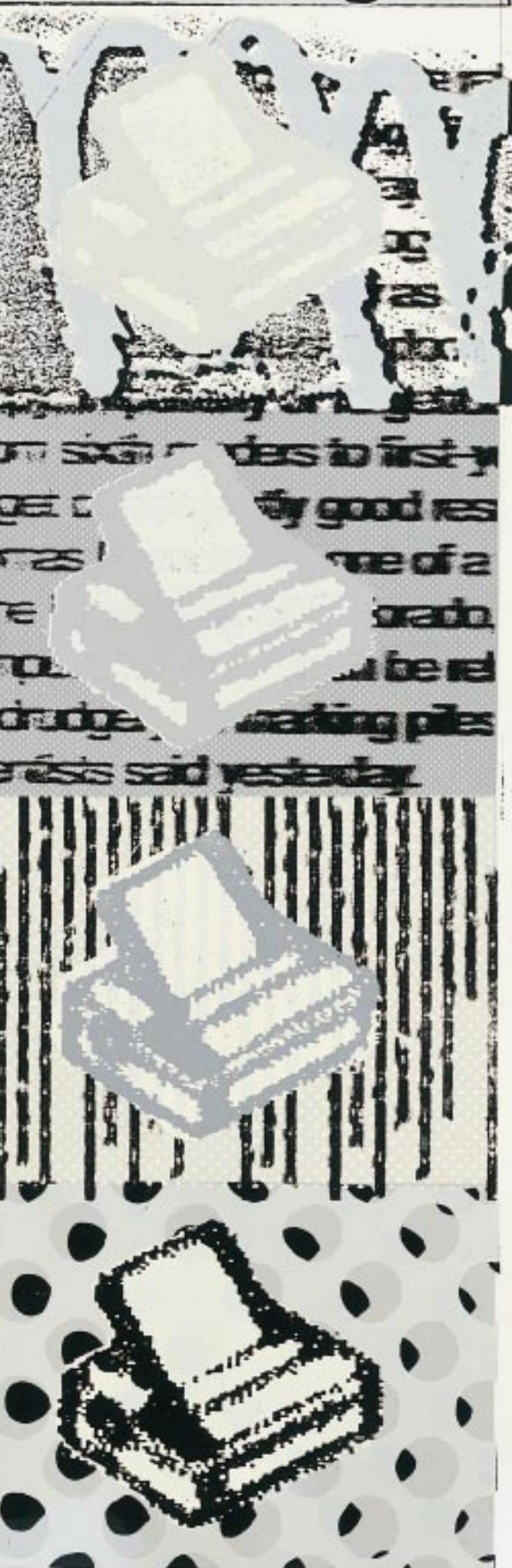
group test

# Quality control





# Printing



One for the home and one for the office? A good-quality laser printer is no longer beyond your means now that **prices have fallen** to inkjet levels. We test five personal and ten small-workgroup laser printers.

Laser printer prices have fallen sharply in recent years. Just a few years ago, you would have had to take out a second mortgage to afford a laser printer for your personal use, while network laser printers were the prized possessions of large- and medium-sized businesses. Today, personal laser printers are as cheap and ubiquitous as inkjets, while network printers no longer have to be shared by large departments, but can be owned by small workgroups. Over the past few years, laser printers have lost out to inkjet printers which have improved dramatically in print quality. They are cheap and can print in colour. For printing in mono, though, laser printers beat inkjets in two crucial areas, quality and speed. For those who need professional-looking documents, good quality is a must. In an office environment, where numerous users are connected to the same printer, speed is of the essence. And, laser printers have lower running costs than inkjets because their consumables (paper and toner) are less expensive.

We have tested five personal laser printers with a rated print speed of around six pages per minute (ppm) and ten small workgroup printers rated at between 12 and 16 ppm. Plus, we have taken a look at how laser printers work and the costs associated with running them.

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• *Printers tested and reviewed by Ajith Ram*

## Ratings

- ★★★★★ Buy while stocks last
- ★★★★ Great buy
- ★★★ Good buy
- ★★ Shop around
- ★ Not recommended

Illustration by Matt Herring

# How laser printers work

There are two main types of "laser printer": the laser and the LED (light emitting diode) varieties. Both work in much the same way. Each page is converted into a bitmap and stored in memory. A photo- or light-sensitive drum is then charged with static electricity. Each point on the drum relates to a point on the paper, with one line of the image written each time the drum spins. By switching on the light source, whether from a laser or from LEDs, the static charge is knocked off the drum where no toner is required. The toner, attracted to the areas where the charge remains, is picked up by the drum as it turns and is deposited onto the paper below. This then passes under a fuser, which presses the toner onto the paper and heats it so it sticks.

## Lasers and LEDs

In laser printers, the laser beam is deflected across the width of the drum by a spinning eight-sided mirror which works in conjunction with the laser, switching on and off at high speed to selectively knock the static charge off the drum. By contrast, LEDs are fixed across the width of the drum, providing a more direct light source.

LEDs have two advantages over lasers. Firstly, LED printers do not need to use complex mirrors. Secondly, LEDs are slightly more accurate, particularly at the extreme fringes of the printed page, because, for every dot printed, there is an LED behind it so the accuracy of the printer is not dependent on the correct alignment of complex mirrors. LEDs are not without their disadvantages, though. They have a fixed resolution, decided by the number of LEDs across the page width. So, a printer with 600 LEDs per inch will have a resolution of 600dpi. They also have the reputation of being less effective at halftoning.

With halftoning, you can print continuous tones and shades of grey. Commercial printing presses are incapable of printing *shades* of an ink so rather than printing a black dot or not, halftoning lets you print large dots close together which are perceived as dark shades, while small dots further apart are seen as lighter shades. The implementation of halftoning varies between printers. While some laser printers achieve it by varying the intensity

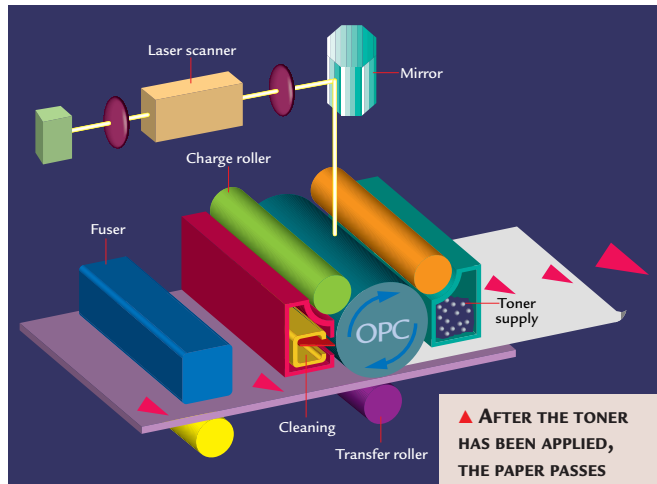
of the light hitting the drum surface, LED printers use a form of interpolation to achieve the same effect.

## Page description language

Personal and network laser printers both share the same means of getting ink onto paper but differ in how they create an image to be printed. Windows and most other common operating systems are now graphical, so although the OS does a certain amount of work in processing the data to display it on the monitor, a great deal of work must still be done to convert it into something the printer can handle. Most personal printers fall into the category of GDI (Graphical Device Interface) or WPS (Windows Printing System). GDI printers scale and rasterise vector shapes. Every GDI printer communicates with the computer via the driver in a unique way. Some GDI printers depend on the host CPU while others have their own print controllers which, although less powerful than those in network printers, take some of the strain off the host CPU.

WPS is based on GDI technology but, as it uses the Windows OS and the host CPU, it standardises the interface with the printer. The advantage over GDI is that it can start to print before the entire page has been rasterised, so reducing the strain on the CPU. As it is a Windows platform, you cannot print from DOS and some claim WPS is not as accurate because it is a generic process which is meant to work across a range of printers.

Network printers typically use one of three page description languages: PostScript, PCL or PrintGear. Adobe PostScript is one of the most popular as it is a device-independent file format. Because it treats images and fonts as geometric objects rather than bitmaps, images can be scaled up or down and will faithfully recreate the original file



whether it is on a 600dpi laser printer or a high resolution image-setter. To print PostScript files your printer must have a built-in interpreter.

PrintGear was designed for use in the SoHo market, unlike PostScript which is aimed at large networks and printers. It uses a RISC print controller which processes the most common printing functions faster.

Originally developed by Hewlett-Packard (HP), Printer Control Language (PCL), like PostScript, is a true WYSIWYG format supporting scalable fonts. It is optimised for printing from GUIs like Windows and OS/2, so reducing the commands which need to be processed by the printer. It also provides advanced features like font synthesis which reduces the storage space required for TrueType fonts in the printer's ROM. Non-HP printers may claim PCL compatibility but none handle PCL in exactly the same way as HP versions.

## Hardware requirements

While some personal printers make do with less than 2Mb of memory and the host CPU to process the image, network printers need more: typically, internal processors, large amounts of RAM, and RIPs (Raster Image Processors). RIPs are a combination of software, hardware or firmware which convert vector images into bitmaps. A RIP can also handle the network print spooling and queuing. What hardware you need depends largely on the size of your organisation (see "The cost of printing", p212).

## Canon LBP 660

Personal

Canon's LBP 660 has a parallel port interface and uses the Windows Printing System (WPS). As a result, the printer does not have its own processor and uses the host PC's CPU to rasterise the image. It also has just 128Kb of RAM —

a small amount compared to some of the other 6ppm printers in this test.

Moreover, there are no free SIMM slots, so the



memory cannot be upgraded. On the plus side, the 660 supports PCL4 emulation in software. The paper input tray is capable of holding up to 100 sheets, with another slot available for manual feeding. This printer is not an easy one to operate. Although driver installation went without a hitch, troubleshooting was a different experience. Much of this has to do with the absence of any indicator lights on the printer, which makes it difficult to tell what exactly the printer is doing. Also, unlike the QMS printer driver, the LBP 660 driver provides no feedback on the printer's status. Text-printing speeds exceeded 4ppm — not bad for a

printer rated at 6ppm. Print quality was mixed, but despite the dense black regions showing clear banding and pixellation, its handling of halftoning was disappointing. Text output was excellent.

### PCW DETAILS

★★★★

**Price** £257.32 (£219 ex VAT)

**Contact** Canon 0121 666 6262

[www.canon.co.uk](http://www.canon.co.uk)

**Good Points** Fast printing speeds.

**Bad Points** RAM not upgradeable.

**Conclusion** Particularly good at graphics.

## Kyocera FS 600

Personal

The FS 600 is an entry-level printer which would make a good contender in the small-network printer market. It sports a 50MHz PowerPC processor and an ethernet interface as well as the standard enhanced parallel port.

It has 4Mb of RAM, upgradeable to 36Mb via a single

SIMM

slot, and support for HP PCL 5 as standard. Adobe PostScript support is



available as an upgrade. This is an impressive spec for a 6ppm printer and should cater for your future home or business network needs. Even the paper input tray is upgradeable, from a 150-sheet tray and manual feeder to a 250-sheet tray. Kyocera claims low usage of consumables due to its ECOSYS technology. As this allows just the toner to be replaced, rather than the entire cartridge, Kyocera states that it lowers costs and makes the printer environmentally friendly. Installation was a breeze and the driver menu is very user friendly. It identifies the interface and provides easy access to settings. The FS 600 claims 6ppm

but in our tests it slightly exceeded this while printing text. Its print quality was excellent, particularly in its handling of halftones and fine details.



### PCW DETAILS

★★★★★

**Price** £351.33 (£299 ex VAT)

**Contact** Kyocera 0118 923 0660

[www.kyocera.co.uk](http://www.kyocera.co.uk)

**Good Points** Very upgradeable.

Easy installation. Fast printing.

**Bad Points** Costly.

**Conclusion** A printer which performs well in all respects.

## Panasonic KX-P6300

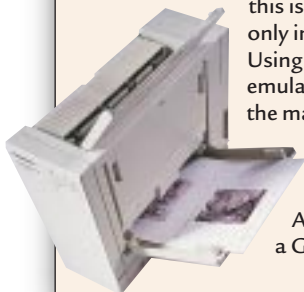
Personal

The KX-P6300 has a unique shape. It stands upright and looks more like a small tower PC. This design makes its footprint small enough to fit on a crowded desktop. There is 256Kb of RAM which can be increased to 1.25Mb. It has a maximum resolution of 600dpi but

this is achievable only in GDI mode. Using PCL 4.5 emulation, the maximum

resolution falls to 300dpi.

Although it is a GDI laser



printer, it does not have its own print controller but depends on the host CPU to rasterise the image. It can handle A4 paper and envelopes of differing sizes. There is one paper-in tray, for both regular and manual feeding, which can hold a maximum of 100 sheets, but due to the printer's unique design there is no space available for an extra in-tray. Setting up the printer was relatively easy but the printing process is not trouble free. Although there are three LED lights on the control panel, their purpose is not immediately apparent. Moreover, several times during our tests the printer stopped, apparently because of insufficient

memory. Fortunately, the driver is versatile enough to help you troubleshoot. Print quality was good overall, with good handling of halftones and fine details, although it was let down by flaky ink.

### PCW DETAILS

★★★★

**Price** £257.32 (£219 ex VAT)

**Contact** Panasonic 01344 853081

[www.panasonic.co.uk](http://www.panasonic.co.uk)

**Good Points** Compact size.

**Bad Points** No extra paper tray.

Hiccups while printing.

**Conclusion** A printer that saves on desk space.

## QMS DeskLaser 600 Personal

The DeskLaser 600 has a modest 7MHz Mitsubishi RISC processor and 1Mb of RAM.

An enhanced version of the same printer, the 600P, is available with 2Mb RAM and a

16MHz AMD 29202 processor.

The DeskLaser 600 is targeted at Windows users and so,

being a WPS (Windows Printing System) printer, you can only print from Windows.



Its big brother however, the 600P, uses PCL6 emulation and with this you can print from any OS you choose. The DeskLaser 600 paper input tray is capable of holding up to 100 sheets. It also has a manual feed option. The paper output tray holds just 30 sheets. The QMS printer driver menu is one of the most user-friendly around. Unlike many others, the driver provides detailed feedback about the various stages of the printing process. For instance, if there is a paper jam while printing, it reports it immediately and suggests ways to solve the problem. The menu also provides the option to pause or delete the job in progress. The DeskLaser 600 has a text

printing speed of 4.2ppm — not bad for a printer rated as 6ppm. Unfortunately, the output suffered from banding and posterisation.

### PCW DETAILS

★★★

**Price** £210.33 (£179 ex VAT)  
**Contact** QMS 01784 445555  
[www.qms.nl](http://www.qms.nl)

**Good Points** User-friendly driver menu. Fast printing speeds.

**Bad Points** RAM not upgradeable. Mediocre print quality.

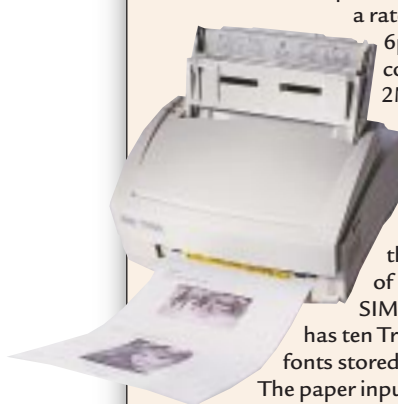
**Conclusion** A good choice for a personal printer.

## Tally T9006 Personal

This GDI printer is built around a 16MHz AMD processor and has a rated speed of

6ppm. It comes with 2Mb of RAM which can be upgraded to 18Mb by the addition of a single SIMM. It also has ten TrueType fonts stored in ROM.

The paper input tray can store 100 sheets and there is



provision for manual feed. The T9006 has only a parallel port as an interface — adequate for its purpose as a personal printer but limiting if you want to put it on a small network. It is, literally, one of the hottest printers on the market. For some reason which we could not identify, the front underside of the unit becomes hot within a few minutes. Restarting and leaving the front bay open does not solve this problem. The T9006 is a difficult printer with which to work. Although driver installation went flawlessly, printing was a chore. Quite often the printer would stop while printing a page or would refuse

to print the rest, and there was a lack of warning signals. Additionally, it was one of the slowest printers in this group test, with an average text printing speed of only 1.4ppm.

### PCW DETAILS

★★

**Price** £316.07 (£269 ex VAT)  
**Contact** Tally 01895 252131  
[www.tally.co.uk](http://www.tally.co.uk)

**Good Points** Its ability to hold a lot of RAM.

**Bad Points** Slow printing speed. Not easy to troubleshoot. Runs hot.

**Conclusion** Slow. Printing was a chore.

## Canon LBP 1760 Small Workgroups

Supporting a 50MHz Intel processor, the LBP1760 has a rated print speed of 16ppm. Its 4Mb of RAM is expandable to 36Mb with a 32Mb SIMM and its 4Mb ROM can be upgraded with a flash memory module. By compressing data in its

memory, the 1760 avoids print overruns, claims Canon.

It has a true 600dpi resolution or 1200dpi at half



speed, and an interpolated resolution of 2400dpi. Unlike most laser printers, a ceramic heater is used, rather than a fuser drum, to fix the toner to the page. Canon claims that this leads to faster startup, yet in our tests the ceramic heater provided no advantage. The LBP 1760 has a rated startup time of 25 seconds. In our tests, the warm-up period proved to be at least twice that — longer than most others here. There is a 500-sheet paper input cassette plus a manual feed tray to hold another 100 sheets. A 500-sheet input tray is optional. The printer supports PCL. Text printing speeds were just over 10ppm —

well below its rated top speed. Print quality was average. The black regions showed clear banding and the lighter regions appeared partly washed out.

### PCW DETAILS

★★

**Price** £1,056.32 (£899 ex VAT)  
**Contact** Canon 0121 666 6262  
[www.canon.co.uk](http://www.canon.co.uk)

**Good Points** Upgradeable RAM. ROM.

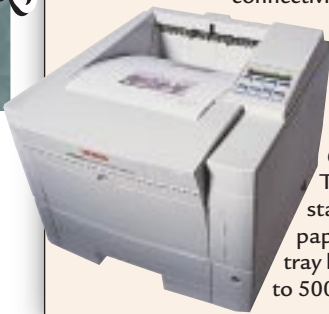
**Bad Points** Average printing speeds. Mediocre print quality.

**Conclusion** A reasonably priced printer let down by poor print quality

## Digital LN15+N

Small Workgroups

This 16ppm printer is the latest addition to the Digital printer line. It is based around a 125MHz MIPS processor and comes in two flavours: the 12Mb LN15+P with a parallel port connection, and the 20Mb 15+N with ethernet connectivity. Both models can be upgraded to a maximum of 68Mb. The standard paper input tray holds up to 500 sheets.



The optional second input tray holds 450 sheets. There is also a multifunction feeder capable of holding 100 sheets. The printer's true resolution of 600dpi can be enhanced to 2400dpi through interpolation. It has support for PostScript and PCL 5e as standard, although unusually the drivers for both are not automatically installed. Manually installing them puts two icons under the printer menu. The printer's driver supports all Microsoft operating systems from Windows 3.1, as well as operating systems commonly used on DEC networks, such as Unix. Setting up the Digital printer on a network is easy. It comes with an excellent

manual and a CD containing the drivers. The overall print quality, particularly text, was good. It was not so hot on halftoning and print speeds were unexceptional.

### PCW DETAILS



**Price** £1,429.98 (£1,217 ex VAT)

**Contact** Genicom 01252 744400  
[www.digital.com](http://www.digital.com)

**Good Points** Powerful processor. PostScript. PCL support.

**Bad Points** Average printing speed.

**Conclusion** A robust printer for small and medium networks.

## Epson EPL-N1200

Small Workgroups

This 12ppm laser printer is one of Epson's small network laser printers in a range which now includes 8ppm to 40ppm mono lasers and even a colour laser printer. Sporting a 20MHz RISC processor, the EPL-N1200 has only 2Mb of RAM but Epson claims this is equivalent to 4Mb due to its MITech process.



Physical memory can be increased to 68Mb with the addition of two 32Mb

SIMMs. There is a paper input tray capable of holding 250 sheets and two optional, additional trays will each hold 500 sheets. Manual feed is via the standard tray. Support for PCL 5e comes as standard, although PostScript support will cost extra. This printer only has drivers for Windows 3.1, 95/98 and NT. The control panel on the printer itself is a confusing array of arrows and letters, but fortunately, selecting the printer settings through the driver menu is much easier. You can even password protect it. In our tests, the EPL-N1200 had an average speed of over 11ppm but graphics printing speed was less impressive.

The overall print quality was very good with black regions showing little sign of banding, although its handling of halftoning was less impressive.

### PCW DETAILS



**Price** £938.83 (£799 ex VAT)

**Contact** Epson 0118 988 2992  
[www.epson.co.uk](http://www.epson.co.uk)

**Good Points** RAM easily upgradeable. PCL support.

**Bad Points** Confusing control panel.

**Conclusion** A network printer which merits consideration.

## Fujitsu PrintPartner 16ADV

Small Workgroups

This is a 16ppm network-ready laser printer with a 125MHz processor from Fujitsu. It comes with a standard 8Mb RAM expandable to 68Mb and there is the option to increase existing ROM by the addition of a flash card. The PrintPartner 16ADV has support for PCL and PostScript. As well as an enhanced parallel port, it also has ethernet connectivity. There is one paper cassette to hold 550 sheets, and another tray for



manual feed. Another cassette, with a 500-sheet capacity, is optional. The PrintPartner has a true resolution of 600dpi which can be scaled to 1200dpi using Fujitsu's FEIT image enhancement technology. Installing the printer is easy, although operating it is not quite so straightforward, partly due to the confusing buttons on the control panel. The printer driver menu is easily customisable: it provides one-click access to most functions such as resolution settings, paper size and graphics quality. The printer's text printing speed compared well with its top-rated speed of 16ppm. Overall print quality was excellent, with

rich detail in the dark regions and good handling of greyscales. Its text output was equally good, being clearly legible even at small font sizes.

### PCW DETAILS



**Price** £1,321.87 (£1,125 ex VAT)

**Contact** Fujitsu 0181 606 4604  
[www.fujitsu-europe.com](http://www.fujitsu-europe.com)

**Good Points** Support for PCL and PostScript. RAM. ROM is upgradeable.

**Bad Points** Slow while printing graphics.

**Conclusion** A good network printer at an attractive price.

## HP LaserJet 4000TN Small Workgroups

At 17ppm, the LaserJet 4000TN is one of the fastest printers in this test. It has a powerful 100MHz print controller, and 8Mb of RAM which can be expanded to 100Mb, and an optional 1.4Gb IDE hard drive is available. This drive can be used to hold regularly printed items like forms, signatures and fonts. The driver for this printer makes use of HP's JetSend protocol which lets you hook up a scanner to the printer



without having to use a PC to transfer the data. HP has one of the most comprehensive networking software suites on the market. This suite permits remote access to the HP printer and other devices on the network and it constantly monitors the printer's status, informing the administrator of possible problems like low toner. The 4000TN supports HP's own PCL 6 file format and Adobe's PostScript 2 as standard, and due to its powerful processor, it processes PostScript files fast. Text and graphics printing speeds were impressive, too. Overall, the print quality was good, although not as good as some of the other printers in this group. The black regions show

slight streaking, and there was some posterisation on the graphics. Overall though, it put up a decent performance.

### PCW DETAILS



**Price** £1,316 (£1,120 ex VAT)

**Contact** Hewlett-Packard  
0990 474747 [www.hp.com](http://www.hp.com)

**Good Points** Fast printing.  
Good print quality.

**Bad Points** Print quality not up to HP's usual standard.

**Conclusion** Excellent speed for a good price.

## Kyocera FS 1700+ Small Workgroups

The FS 1700+, like the 6ppm FS 600 (p192), has a PowerPC processor but running at a higher clock speed of 66MHz. It comes with 4Mb of RAM, upgradeable to 68Mb with the addition of two SIMMs. The FS 1700+ uses ECOSYS

technology which, says Kyocera, reduces the overall cost of printing. The 1700+ has a true printing resolution of 600dpi, which



can be increased to 2400dpi using Kyocera's image refinement technology. Adobe PostScript is supported, as is the latest version of PCL. It also emulates other printers from manufacturers such as IBM and Epson. As befitting a good network printer, it has an ethernet interface and support for popular protocols. It also has an enhanced parallel port for connecting to individual PCs. The standard paper input tray holds up to 250 pages, and in combination with two other optional trays, this capacity can be increased to 850. Driver installation is easy, and the menu provides access to easily configurable printer settings.

The networking protocols can also be easily set. Print quality was almost as good as the smaller FS 600. The prints showed excellent detail in the darker regions, with no banding.

### PCW DETAILS



**Price** £821.32 (£699 ex VAT)

**Contact** Kyocera 0118 931 1500  
[www.kyocera.co.uk](http://www.kyocera.co.uk)

**Good Points** Powerful processor.

**Bad Points** None.

**Conclusion** A good-value printer that is capable of producing high-quality output.

## Lexmark Optra K1220 Small Workgroups

With a print speed rated at 12ppm, the K1220 is aimed primarily at small businesses. Built around a 33MHz Intel processor, this laser printer comes with only a standard 2Mb of memory but this is expandable to 66Mb using two extra SIMMs. It also

has an optional internal print server. ROM can be increased by adding a flash memory



module. The K1220 has a true resolution of 600dpi (1200dpi interpolated). Lexmark claims its two-part toner and drum system reduces the print cost per page. The paper input tray holds 200 sheets and there is a separate single-sheet manual feeder as standard. There's an optional input tray to hold a further 450 sheets and a 90-sheet multi-purpose feeder, too. PCL 6 (latest version) and Adobe PostScript 2 are supported as standard and the printer is compatible with major networks. With text printing speeds exceeding 10ppm, the K1220 is a good contender in the small-network printer market. Graphics printing

speeds did not exceed 7ppm but the quality of printed text was excellent and the graphics were the best we saw in this test.



### PCW DETAILS



**Price** £722.63 (£615 ex VAT)

**Contact** Lexmark 01628 481500  
[www.lexmark.co.uk](http://www.lexmark.co.uk)

**Good Points** Upgradeable RAM.  
Hard drive.

**Bad Points** Nothing drastic.

**Conclusion** Good value network printer.

## Minolta PagePro 12 Small Workgroups

**H**ousing a powerful 100MHz print controller, the PagePro 12 has 4Mb of RAM which can be increased to 36Mb by the addition of a SIMM. Support for PCL 5e is standard, while PostScript 2 support is optional. The printer has a parallel port with ethernet as an option and there is support for common

networking protocols such as Ethertalk and TCP/IP. A true 600dpi printer, the PagePro can



increase the resolution to 1,200dpi through interpolation. It comes with exhaustive documentation which delves into the finer aspects of setting up a network printer as well as proper operating procedures which could affect power consumption and toner usage. The driver interface is equally useful. Dotted with large icons, it provides easy access to the most common settings. Minolta rates the PagePro's speed at 12ppm — text printing speed proved to be comfortably close to this at nearly 11ppm. However, while printing graphics, the PagePro's output rate fell dramatically. The overall print quality was above average,

although there was a little pixellation in the darker regions and occasional banding. This was particularly true of printed graphics.

### PCW DETAILS

★★★★

**Price** £870.67 (£741 ex VAT)

**Contact** Minolta 01908 200400

[www.minolta.com](http://www.minolta.com)

**Good Points** Powerful print controller. Good documentation.

**Bad Points** Very slow while printing graphics.

**Conclusion** A network printer offering good text quality.

## QMS DeskLaser 1600P Small Workgroups

**T**he DeskLaser 1600P has a powerful RISC processor, as befits a 16ppm network printer. The 125MHz controller is powerful enough to churn through most difficult printing jobs, particularly while handling processor-heavy duties like printing PostScript files.

It has 12Mb of memory, upgradeable to 68Mb (users must buy this extra memory from QMS). At present, the 1600P is able to



operate only from Windows 95, NT or Mac environments (there is no Unix support). The printer supports PCL 6 and PostScript 2, although network support is an optional extra on the base model. The paper input tray is capable of holding 500 sheets. An optional, additional tray will also hold 500 pages. There is a manual feeder, too. Setting up the 1600P on a network is painless. It comes with an excellent manual and an installation CD with the necessary drivers and utilities. The 1600P's menu provides the useful facility of being able to configure settings from the driver menu — great for system administrators. A fast print speed

produced over 12ppm and gave excellent results with rich blacks and good handling of halftones.



### PCW DETAILS

★★★★

**Price** £816.63 (£695 ex VAT)

**Contact** QMS 01784 445555

[www.qms.nl](http://www.qms.nl)

**Good Points** Easy installation. Good quality output.

**Bad Points** No support for Unix.

**Conclusion** A good network printer with acceptable speed.

## Xerox DocuPrint N17 Small Workgroups

**B**uilt around a 66MHz processor from Intel, the DocuPrint N17 has 16Mb of RAM expandable to 64Mb. The N17 uses Xerox' WorkSet technology, which has a Send Once, RIP Once, Print Many capability: it holds print commands at the printer rather than on the network, ensuring that documents of which

you want more than one printed copy are processed only once. Additionally, one page can be printed while the next is being



processed. The comprehensive network management suite includes the CentreWare Internet Services package enabling remote management of the printer, and PrinterMap which provides access to all network printers regardless of manufacturer. It has built-in support for PCL 5e and is one of the few network printers to support Adobe PostScript Level 3. The paper cassette holds 250 sheets, with a 100-sheet bypass feeder. The upgrade option from Xerox is the size of a filing cabinet with a paper feeder capable of holding 2,500 sheets, taking the full paper capacity to 2,850 sheets. Also, unlike many other printers, the duplex module comes as standard.

The DocuPrint N17 produced an average text printing speed of just over 14ppm, but the graphics printing speed was less than half this. Overall print quality was good.

### PCW DETAILS

★★★★

**Price** £1,004.63 (£855 ex VAT)

**Contact** Xerox 0800 632642

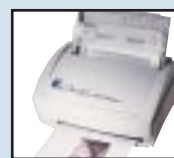
[www.xerox.co.uk](http://www.xerox.co.uk)

**Good Points** Powerful processor. Good network management software.

**Bad Points** Average graphics speed.

**Conclusion** A good choice for those printing large numbers of documents.

## Table of features



MANUFACTURER	CANON	KYOCERA	PANASONIC	QMS	TALLY
MODEL	LBP 660	FS600	KX-P6300	DeskLaser 600	T9006
Price (ex VAT)	£219	£299	£219	£179	£269
Contact	0121 666 6262	0118 923 0660	01344 853 081	01784 445555	01895 252131
URL	<a href="http://www.canon.co.uk">www.canon.co.uk</a>	<a href="http://www.kyocera.co.uk">www.kyocera.co.uk</a>	<a href="http://www.panasonic.co.uk">www.panasonic.co.uk</a>	<a href="http://www.qms.nl">www.qms.nl</a>	<a href="http://www.tally.co.uk">www.tally.co.uk</a>
Rated print speed	6ppm	6ppm	6ppm	6ppm	6ppm
Print controller	x	50MHz PowerPC	25MHz RISC	7MHz Mitsubishi	16MHz AMD
RAM/max RAM	128Kb / 128Kb	4Mb / 36Mb	256Kb / 1.25Mb	1Mb / 2Mb	2Mb / 18Mb
Paper tray (in/out)	100 / 50	150 / 100	100 / 50	100 / 30	100 / 30
Optional tray capacity	x	250	x	x	x
PostScript/PCL	✓ / x	✓ / Optional	✓ / x	x / x	x / x
Optimal resolution/interpolated	600 / 600	600 / 1200	600 / 600	600 / 600	600 / 600



MANUFACTURER	CANON	DIGITAL	EPSON	FUJITSU	HEWLETT-PACKARD
MODEL	LBP 1760	LN15+N	EPL-N1200	PRINTPARTNER 16ADV	LASERJET 4000TN
Price (ex VAT)	£899	£1,217	£799	£1,125	£1,120
Contact	0121 666 6262	01252 744400	0118 988 2992	0181 606 4604	0990 474747
URL	<a href="http://www.canon.co.uk">www.canon.co.uk</a>	<a href="http://www.digital.com">www.digital.com</a>	<a href="http://www.epson.co.uk">www.epson.co.uk</a>	<a href="http://www.fujitsu-europe.com">www.fujitsu-europe.com</a>	<a href="http://www.hp.com">www.hp.com</a>
Rated print speed	16ppm	16ppm	12ppm	16ppm	17ppm
Print controller	50MHz Intel	125MHz MIPS	20MHz RISC	125MHz Fujitsu	100MHz RISC
RAM/max RAM	4Mb / 36Mb	20Mb / 68Mb	2Mb / 68Mb	8Mb / 68Mb	8Mb / 72Mb
Paper tray (in/out)	500 / 250	500 / 250	250 / 350	550 / 250	600 / 250
Optional tray capacity	500	450	1000	500	575
PostScript/PCL	Optional / ✓	✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓
Optimal resolution/interpolated	600 / 2400	600 / 2400	600 / 1200	600 / 1200	600 / 1200



MANUFACTURER	KYOCERA	LEXMARK	MINOLTA	QMS	XEROX
MODEL	FS 1700+	OPTRA K1220	PAGEPRO 12	DESKLASER 1600P	DOCUPRINT N17
Price (ex VAT)	£699	£615	£741	£695	£855
Contact	0118 931 1500	01628 481500	01908 200400	01784 445555	0800 632642
URL	<a href="http://www.kyocera.co.uk">www.kyocera.co.uk</a>	<a href="http://www.lexmark.co.uk">www.lexmark.co.uk</a>	<a href="http://www.minolta.com">www.minolta.com</a>	<a href="http://www.qms.nl">www.qms.nl</a>	<a href="http://www.xerox.co.uk">www.xerox.co.uk</a>
Rated print speed	12ppm	12ppm	12ppm	16ppm	17ppm
Print controller	66MHz PowerPC	33MHz Intel	100MHz RISC	125MHz RISC	66MHz Intel
RAM/max RAM	4Mb / 68Mb	2Mb / 66Mb	4Mb / 36Mb	12Mb / 68Mb	16Mb / 64Mb
Paper tray (in/out)	250 / 250	200 / 200	500 / 250	500 / 250	250 / 250
Optional tray capacity	250	450	500	500	2500
PostScript/PCL	✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓
Optimal resolution/interpolated	600 / 1200	600 / 1200	600 / 600	600 / 2400	600 / 1200



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*The quick brown fox jumped over the lazy dogs back.*



**Canon LBP 660**

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**Kyocera FS 600**

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**Panasonic KX-6300**

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**QMS DeskLaser 600**

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**Tally T9006**

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**Canon LBP 1760**

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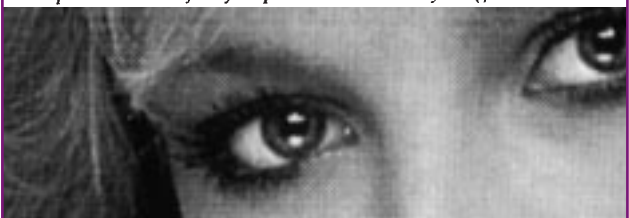
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**Digital LN15+N**

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**Epson EPL-N1200**

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**Fujitsu PrintPartner 16ADV**

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*The quick brown fox jumped over the lazy dogs back.*



**HP LaserJet 4000TN**

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**Kyocera FS1700+**

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**Lexmark Optra K1220**

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**Minolta PagePro 12**

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**QMS DeskLaser1600P**

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*The quick brown fox jumped over the lazy dogs back.*



**Xerox DocuPrint N17**

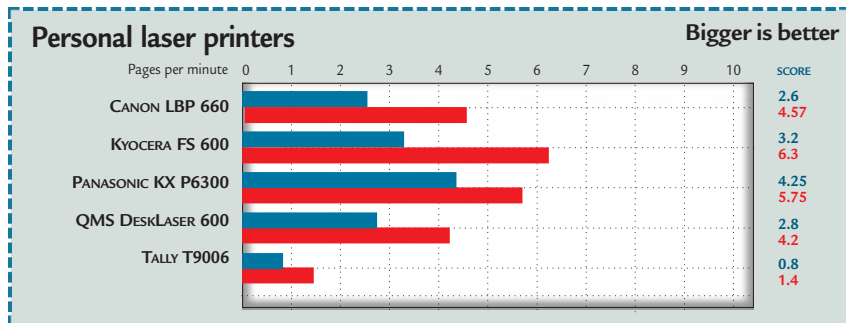
## Printer output tests

In our printer output trials, we ran a series of tests which covered every aspect of the printers' output. We have reproduced those results [above] which we feel are most apt: that is, text and graphics output.

In the text test we were looking mostly for legibility when printing very small font sizes. The more accurate the output at these sizes, the better it will print in larger text sizes.

In the graphics part of the test, we were looking to see how each printer coped with fine detail and shading, known as halftoning, especially in the lighter areas. We marked down those printers that created streaky or checked (posterised) output on the photograph, or which misjudged greyscales or coped badly with very light areas.

## PCW Labs Report



■ Graphics speed

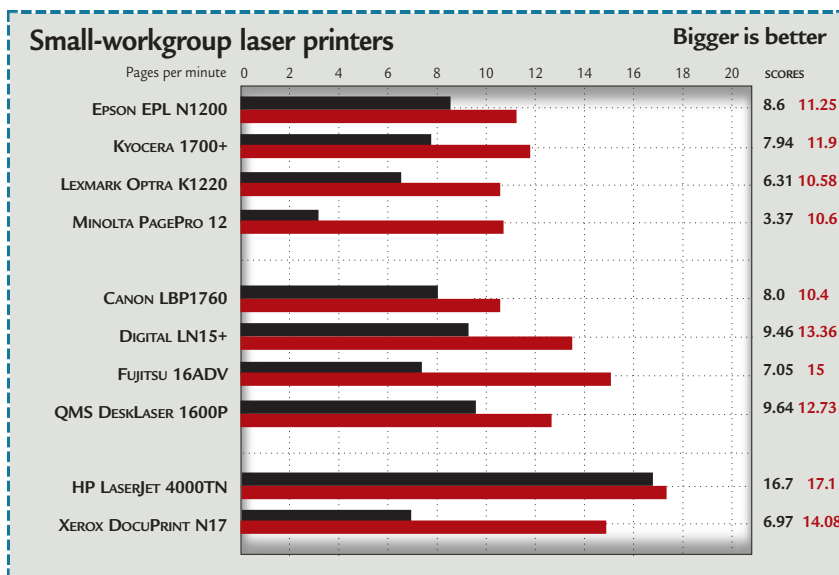
■ Text speed

More than anything else, the results of the personal laser printer part of our tests show just how exaggerated some manufacturers' claims are. All the printers in this section have a rated speed of 6ppm when outputting text, although this is usually based on a coverage of just five percent. However, two printers, the Kyocera FS 600 and the Panasonic KX P6300, were both able to achieve around six pages per minute in our trials.

We divided the small-workgroup printers into three groups of differently rated speeds. The first four are rated as 12ppm printers, the next four as 16ppm and the final two as 17ppm. These tests highlighted the casual abandon with which some companies rate their printers. In our trials, the Canon LBP1760, a 16ppm printer, was slower than the 12ppm printers! Also note the speed at which graphics were printed. We had expected our full-page photo to take much longer to print than text, yet some printers handled graphics considerably better than others. Compare, say, the results of the Epson with a graphics score of 8.6ppm, and the Minolta Page which rated just 3.37ppm.

■ Graphics speed

■ Text speed



## How we did the tests

We tested the laser printers on a PII 400 with 64Mb of RAM. The tests are intended to judge the print speed and quality for both graphics and text. To assess the speed of text output we printed out a standard ten-page document on the personal printers, and a 20-page document on the small-workgroup printers, then repeated the process three times to get an average page-per-minute score.

➤ **To test the speed** of graphics output we printed a 1Mb graphics file ten times on the personal printers and 20 times on the small-workgroup printers, measuring the time taken to produce the first page and then all the pages, again averaging out the scores to give us a pages-per-minute rate.

➤ **To assess** a small-workgroup printer's PostScript capability and the speed of its internal processor, we used a

relatively large 380Kb fractal. This forced the printer to do all the calculations using its own processor rather than the host CPU.

➤ **We used other tests** for quality. These looked for things such as ugly streaks, or banding, when printing large areas of dense black, and took into account the quality of output when using halftoning.

➤ **The small-workgroup printers** were also tested for their ease of setup, networking support and the versatility of their networking software. Additionally, the drivers of both personal and small-workgroup printers were carefully scrutinised, the very light shades in particular. In the graphics test we were looking for how each printer resolved fine detail and whether it created posterised output, with visible horizontal and vertical lines. In the text quality test we looked for sharp edges and legibility, even at very small point sizes.

# Editor's Choice

**W**e were very impressed by most of these laser printers. The quality of output overall was very good, although some showed signs of specific strengths and weaknesses. We were also judging speed, upgradeability and price.

In addition to our winners, a couple of contenders should be mentioned in dispatches. For its raw speed, the HP LaserJet 4000TN should be praised:



◀ [LEFT] THE QMS DESKLASER 1600P  
[FAR LEFT] THE LEXMARK OPTRA K1220

it really can produce the 17ppm it promises. Similarly, the Fujitsu PrintPartner 16ADV should be recognised for its speed and excellent graphics output, and the Kyocera FS 1700+ is inexpensive, fast and produced excellent graphics output.

Three printers stood out from the crowd, though. The **QMS DeskLaser 1600P** is **Highly Commended** for its speed and output but mostly for its very attractive price, far cheaper than any of the other 16ppm printers.



▲ THE KYOCERA FS600

The **Lexmark Optra K1220** is also **Highly Commended**. Not only is it good value for money, but its quality of output was second to none.

Our **Editor's Choice** is a 6ppm model, the **Kyocera FS 600**. It is the most expensive of the personal printers in this group, but you get what you pay for and its output and speed are well worth the extra. It is also easily upgradeable, taking an impressive 36Mb of RAM, and it has a processor as fast as some of those in 12ppm printers.

## The cost of printing

**T**here are several factors to consider when preparing to buy a printer: quality, speed and cost. The last is a complicated one to work out, though. The printer's upkeep costs as well as your initial outlay should be taken into account.

All printers, whether inkjet or laser, personal or network, chew their way through a lot of ink and paper during their lifetime. While lasers do not need the same high quality of paper as inkjets, good-quality paper will nonetheless make a difference to the output. Eighty-gram laser paper will cost you around £3 for 500 sheets, while smoother 90g paper, which will give a better finish, will cost around £5 for 500 sheets.

**The greatest expense**, though, is replacing the toner cartridge. Although one cartridge lasts for thousands of pages, the outlay may be anywhere between £10 and £200 depending on whether the cartridge can be refilled or

whether the whole unit must be replaced. Toner cartridges can be recycled, thus reducing their not insignificant environmental impact, but recycled units vary in quality and some manufacturers recommend you do not use them.

While it was common a few years ago to have to replace the printer drum at the same time as the toner cartridge, this is less common in recent printers. Prices vary greatly, so do check the adverts to see exactly how much it will cost to replace various components.

Networking the printer can also add to the cost. Some network printers do not come with a network card as standard, instead providing it as an option. This adds to the overall cost but does ensure you get the right connection for your network setup.

If your printer is to be shared between users or departments, you should work out what speed of printer you need. As a general rule, the more users you

have sharing a printer, the faster the print speed that will be required. However, print speed requirements also depend on the type of output — text or graphics. In a workgroup such as the PCW editorial office, our 24ppm A4 mono laser is probably over-specified for ten writers who rarely print anything. However, our art and production team also use the A4 mono laser for printing some of their proofs and the extra speed is needed when 12 graphics-heavy pages of a group test are spooled to the printer.

**Think carefully** about the amount of RAM needed in the printer. Add more for large, graphics-intensive work. You will also need to leave room in the SIMMs to add more RAM at a later date, especially if your needs are likely to change — for example, company expansion. Although you will be stuck with the motor and thus the print speed, you can add more RAM or even a network connection to some of the personal printers in this group test.

# group test





# The image makers

In the field of **professional image editing**, nothing but the best will do — and the best are getting better all the time. Ken McMahon passes his magnifier tool over six of today's high-end art packages.

**T**he six graphics packages reviewed here, which combine powerful features with versatility, are aimed at those who need to produce images of the highest standard. Whatever you want to do with an image, be it colour-cast removal or the creation of a sophisticated visual effect, these packages make it possible. If you're serious about pictures, you should be considering one of these applications (*PCW January '99 carries a review of image editing packages for home use*).

The trend, during the past year, has been the addition of web-authoring features. At best, you now need only one application for photo-editing, retouching, special effects and creating and preparing graphics for the web. At worst, you get what you had before, with a few ineffectual features tagged on. There have been improvements in interface design in the past year, too, which make for real

productivity gains, and selective undo has finally arrived in a big way. This boosts productivity by reducing the impact of errors, while simultaneously enhancing creativity by providing the freedom to experiment.

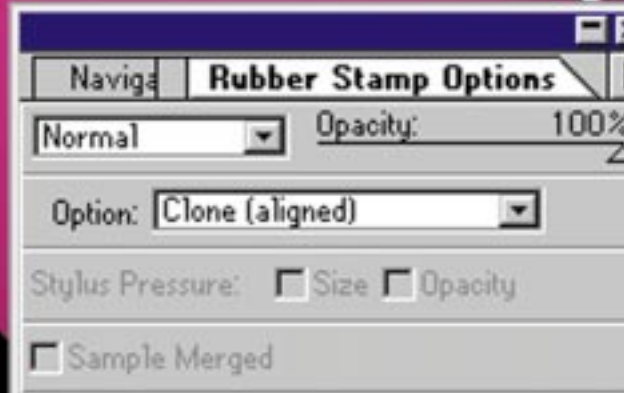
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<b>226</b>	Table of features
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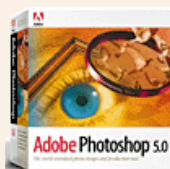
## Ratings

- ★★★★★ Buy while stocks last
- ★★★★ Great buy
- ★★★ Good buy
- ★★ Shop around
- ★ Not recommended

Illustration by Paul Storrack



# Adobe Photoshop 5.0



**P**hotoshop has long been the industry-leading application for professional photo editors.

However, it has been knocked for poor text capabilities, crude and inadequate undo options, lack of colour management and spot colour support. In this latest upgrade, all four of these issues have been addressed and a host of other new features added.

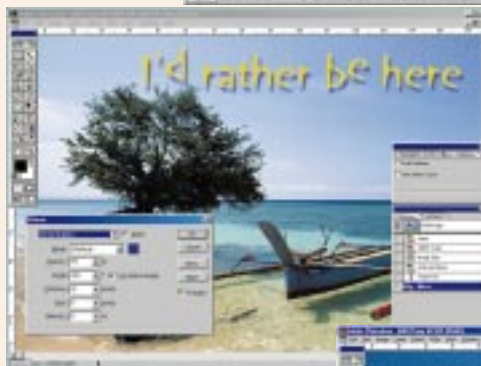
Until now, if you made a mistake in Photoshop you had but one chance, the single undo command, to put things right. But no longer. The History palette, like the Actions palette, displays a chronological list of the edits carried out on an image and each step is called a "state". To return to any state you simply click on it. Regret applying that noise filter before using blur, creating a duotone and cropping? Easy: just click on the state where the filter was applied and delete it. You can record history as far back as your scratch disk will allow (the default setting is 20 states). When you run out of space, the earliest states are deleted to make room for more recent ones. And, you can create snapshots, which remain in the history palette even after the associated states have been deleted, allowing you to experiment with different techniques. You can even clone from one state to another with the history brush.

**One of the bugbears** with pixel editing is what to do with type. Once it is turned into pixels, there's little you can usefully do with it. Layers overcome the problem of destructive editing, so you can at least move type without it leaving a big white hole behind. But if you've applied effects, or added a drop shadow and then need to edit, you almost always need to start again.

Type now resides in its own editable layer which behaves like text, not pixels, until you decide to render it. You can adjust size, tracking, pair kerning, baseline shift, colour or whatever at character level, so, for example, you can make each letter of a word a different font.

Layer effects allow you to apply

drop shadows, bevel and emboss effects quickly and easily. These effects are editable until the type is rendered. You can skew type to which a drop shadow has previously been applied, say, then go back, remove the drop shadow, add



- ▲ **TEXT EFFECTS LIKE THE DROP SHADOW REMAIN EDITABLE UNTIL THE TYPE LAYER IS RENDERED**
- ◀ **PAINTING THE COLOUR INTO AN IMAGE WHICH HAS BEEN CONVERTED TO GREYSCALE THEN BACK TO CMYK, USING THE HISTORY BRUSH**
- ▼ **HUG THOSE VECTOR PATHS WITH THE NEW MAGNETIC PEN**

bevel and make a correction to the text. There's no need to render the text until the final stage of production.

**New selection tools** include a magnetic lasso, magnetic pen and freeform pen. The first automatically hugs contrasting areas when you're trying to draw along an edge. Anyone who has tried drawing accurately with a mouse will know what an impossible task it is, and the magnetic lasso will make life a lot easier for those without a tablet. The magnetic pen works in a similar fashion, creating edge-hugging vector paths. There's also a freeform pen tool that works like the one in Illustrator 7.

Those who make use of the info panel to get pixel colour values will welcome the addition of four-colour samplers. You can place these anywhere in the image to give pixel value readouts for those locations. This information could take some of the guesswork out of accurate colour balancing.

Other refinements include an enhanced actions palette, improved



free transform command, spot colour support, ICC-based colour management, new gradients and improved indexed colour conversion.

## PCW DETAILS



**Price** £452.37 (£385 ex VAT)  
**Upgrade** £193.88 (£165 ex VAT)  
**Contact** Adobe 0181 606 4001  
[www.adobe.com](http://www.adobe.com)

**Good Points** Power and versatility. The industry leader.

**Bad Points** Low on extras. Forget media browsers, special brush collections, image sprays and so on.

**Conclusion** Way to go, pro.

## Corel PhotoPaint 8



**P**hotoPaint software comes on two CDs: one for the applications, fonts, brush textures, photo edges and

samples; the other containing copyright-free images, floating objects, clipart and tiles. There are five extra applications: Corel Capture, Corel Texture, Corel Scan, Corel Script Editor and Bitstream Font Navigator 3.0. A generous allocation of plug-ins includes AutoF/X, Photo/Graphics Edges and Cytopia PhotoLab. In addition you get *Corel PhotoPaint 8, The Official Guide*.

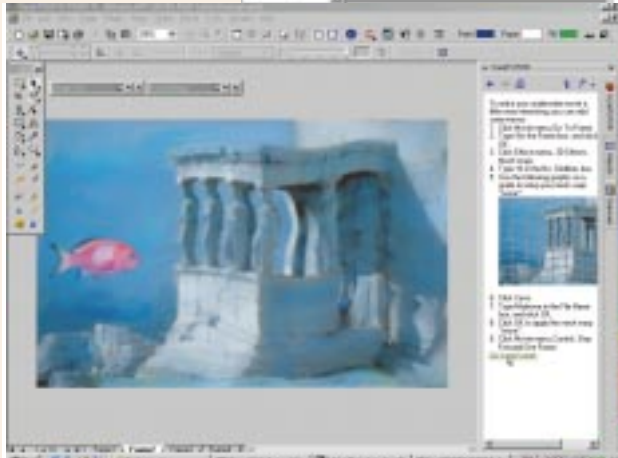
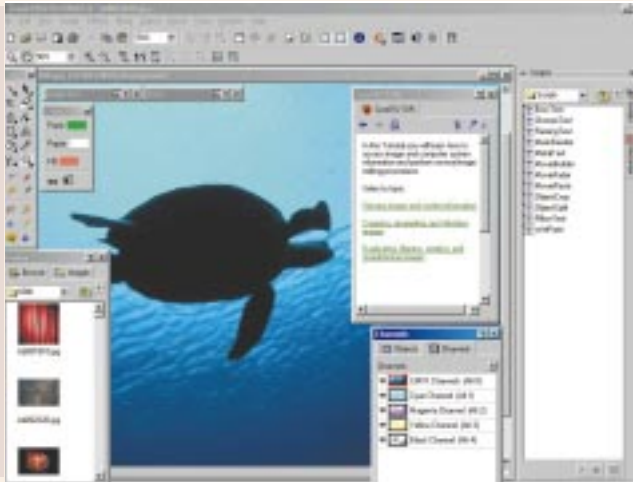
### There's much that's new.

PhotoPaint 8 looks very different to 7. The best aspects of the existing interface have been improved and new features added. The roll-up concept of floating palettes which can be minimised by double-clicking on the title bar, has been extended to produce dockers. These are tabbed palettes which reside in a bay in the image editing window. There are dockers for objects, channels, scripts, the macro recorder, the scrapbook and Corel Tutor.

Dockers give you a lot more screen to work with and speed-up operations where you need to use more than one docker. For example, where you need to lock or rearrange objects before making channel adjustments, you just hit the tab and the required docker comes to the fore. You can drag the tabs out of the docking station to float in the workspace, and palettes can be grouped together. So you can, for example, have the objects and channels dockers in one palette, the recorder and scripts in another and the scrapbook palettes in a third. Double-clicking on a docker's title bar sends it back into the bay on the right of the image window.

**Brush symmetry** is an interesting idea. Whether it will be of any practical value is questionable. There are two kinds of symmetry available, radial and mirror. With the former, you define a centre point and create satellite brushes on the circumference of an imaginary circle. If you select two points, the second

▶ **DOCKERS CAN BE GROUPED INTO SEPARATE PALETTES. HERE WE'VE GOT ONE FOR COREL TUTOR, ANOTHER FOR THE BROWSER, AND YET ANOTHER FOR OBJECTS AND CHANNELS. IF YOU PREFER THEY CAN ALL BE COMBINED INTO ONE SUPERDOCKER ON THE RIGHT**



◀ **COREL TUTOR PROVIDES USEFUL GUIDANCE, HERE HELPING TO CREATE A 20-FRAME ANIMATED GIF**

Of these, a new align and distribute panel, direct previews in the image window, an image stitch command, PostScript 3 support and effect fade are all worthy of mention. Web support comes

in the form of HTML export for image maps using the Publish to Internet feature familiar to Draw 7 users. There is a very good facility for producing and editing gif animations, too.

It goes against the grain to knock a product that has so much to offer, but in one sense, that is exactly the problem. The features frequently get in the way of performing straightforward tasks. Feature for feature, PhotoPaint is a match for just about anything else. But if Corel wants to steal Adobe's clothes, it needs to concentrate on producing a more accessible interface.

brush appears on the opposite side of the circle from the original and rotates about the origin in opposition to the original brush. Mirror works in a similar fashion, duplicating your brush strokes around a vertical or horizontal plane. It's great for creating kaleidoscope patterns, but it's otherwise of limited value.

Orbits are an extension of the symmetry idea. A selection of brush presets provides effects ranging from the interesting to the uninspired. At their best, orbits are like freestyle Spirograph; at their least impressive, they are little more than sophisticated brush styles.

Clip masks allow you to edit an object's transparency without affecting the pixel values of the object itself. Having created a clip mask you can edit it globally, by filling it with a flat or graduated greyscale tint, or by using the paint tools to selectively mask parts of the object.

There are many other new features which add up to significant progress but individually wouldn't justify an upgrade from version 7.

### PCW DETAILS

★★★★★

**Price** £351.32 (£299 ex VAT)

**Contact** Corel 0800 973189

[www.corel.com](http://www.corel.com)

**Good Points** Feature-filled. Lots in the box.

**Bad Points** Complicated. Hard to see the wood for the trees.

**Conclusion** Extensive, but hard work.



## Metacreation's Painter 5.5 Web Edition



Metacreation's applications tend to be a little out of the ordinary and Painter 5.5 Web Edition is no exception. Its unique selling point is natural media, tools and features which emulate the real thing. Painter is less about image editing than image creation. Although you can use a photo as a tracing source, you won't find the usual array of colour-balancing and photo-editing tools. Instead, Painter provides the means to create illustrations that look as if they had been produced with oils on canvas, acrylics on hardboard, or many other media combinations.

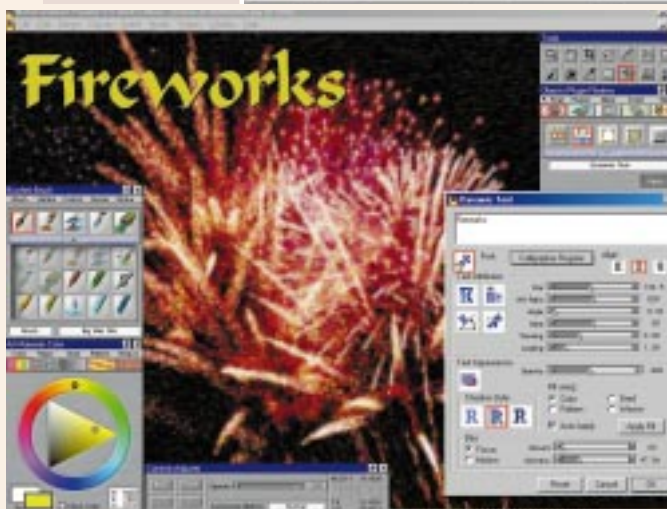
With each new release of Painter, an innovative, often unique feature is pulled out of the hat. Version 4 introduced image hoses and the unmatched mosaic tool. With version 5.0 we were treated to dynamic plug-in floaters which produced instant editable special effects. As the name suggests, 5.5 Web Edition adds web authoring tools. Yes, you can output HTML image maps, but there's nothing new there.

**An innovative feature** is image slicing. A typical application for this would be a button bar, a band along the top of a web page with six or so buttons to take you to other pages. This would be implemented as a single graphic with an HTML image map, allowing you to define separate links for different areas on the bar. Image slicing allows you to easily split the bar up and reassemble it in an HTML table so you can't see the joins.

There are two advantages to this. First, it may be possible to use smaller, more highly compressed file formats for some parts but not others. For example, some buttons may be just text on a plain colour background, while others may be photographic images. For the former you could use a 4-bit gif, for the latter a 24-bit jpeg. Second, part of the image-slicing repertoire includes the ability to create JavaScript rollovers, two- or three-state buttons which change when you point and click on them. This powerful combination of image slicing and rollover creation makes what was a tricky task a simple affair.

► **USING PAINTER'S IMAGE SLICER PLUG-IN TO CREATE A WEB PAGE WITH JAVASCRIPT ROLLOVERS**

▼ **THE DYNAMIC TEXT PLUG-IN FLOATER LETS YOU CREATE EDITABLE TEXT EFFECTS**



There's a raft of other web-authoring features. The creation of seamless tiles is made that much easier using wraparound colours which continue brush strokes off one side of a tile and onto the other. There's a fractal pattern tile generator, too. The new Dynamic Text plug-in allows you to create editable text effects including drop and inner shadows, pattern and graduated fills, and motion blur.

**Producing animated gifs** is relatively simple. Painter can open QuickTime movies as animation stacks or you can create movies from stack. Onion skinning shows you subsequent frames in the animation, and there are control buttons for skipping through frames and playing the animation. When it is saved, you can set the colour depth and inter-frame delay and specify whether out or gamut colours are dithered or quantised to the nearest palette colour. There's no way of previewing these changes though, so you have to save the image and see how it looks.

There are a few goodies on the CD — a small selection of brushes designed specifically for the web, and some arrows, buttons, objects, patterns and rules. These are by no means exhaustive and you could probably pick up more in ten minutes from

one of the many web sites offering this kind of thing for free.

Painter 5.5 is not for those who like to get easy results, fast. To make the most of it requires skill and hard work. But its natural-media features are unequalled. If you spend any amount of time stitching together large images in HTML tables or producing JavaScript rollovers, it's worth buying just for that.

### PCW DETAILS



**Price** £329 (£280 ex VAT). Upgrade from version 5, £57.57 (£49 ex VAT)

**Contact** Computers Unlimited  
0181 200 8282

[www.metacreation.com](http://www.metacreation.com)

**Good Points** As near to paint and canvas as you can get without the need for a smock. Javascript with ease.

**Bad Points** Like the real thing, it takes skill and effort.

**Conclusion** One for real artists and frustrated web developers.

## Ulead PhotoImpact 4.2



Ulead has upgraded its professional image editing package with numerous web features: primarily, a gif animator, button designer

and SmartSaver, which is a utility for optimising gif and jpeg images for web viewing. There's also a new background designer and EasyPalette, which provides drag-and-drop effects and retouching brushes. The interface is a combination of Windows 95 supplemented by the EasyPalette. There's a standard toolbar at the top with a toolbox docked on the left and colour tools on the right.

### The EasyPalette

can be used to access a variety of filters and special effects brushes.

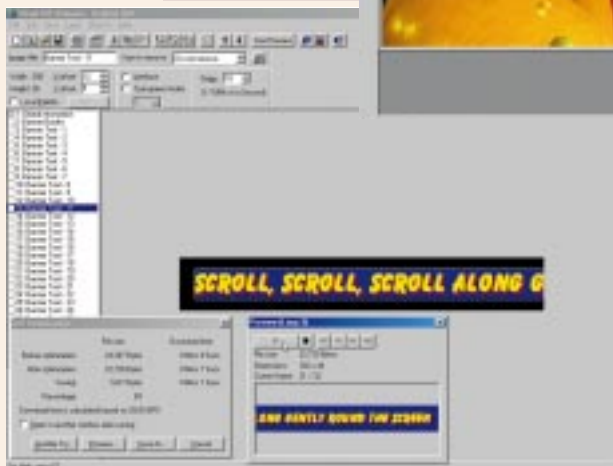
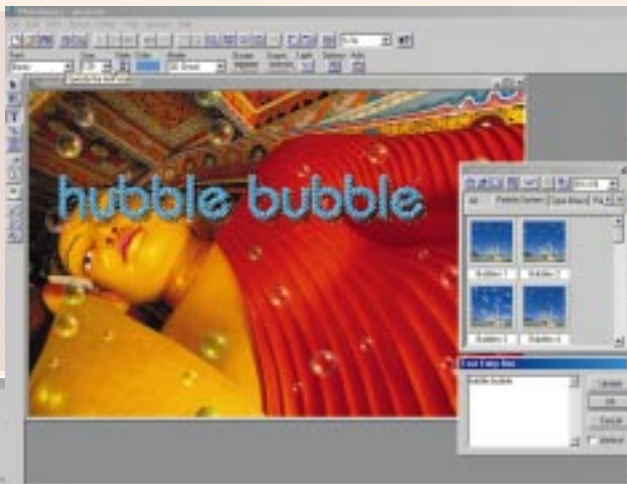
First, you select a category from a pulldown menu. Available options include creative gallery, material gallery and painting gallery. Thumbnail icons give a small pictorial demonstration of the effect which is applied by dragging it into the image window. Global effects do their stuff and you then have the option of undo if you don't like the result.

Other effects are brush-based presets. Dragging them into the image window selects the tool and sets the parameters in the context-sensitive ribbon below the standard toolbar. Trying out these effects is a good way to find out how the tools work and what they are capable of. There is also a wide range of special effects, of which Particle effects is the most impressive, allowing you to apply rendering effects such as bubbles, fog, rain and fire. There are 22 variations of the page curl effect.

When you try some real-world editing, you soon discover that PhotoImpact's interface can be counter-intuitive to say the least. Part of the EasyPalette functions as a layer manager but when we added a type object together with a drop shadow, the background image disappeared from the layer manager.

▶ **APPLY EFFECTS SIMPLY BY DRAGGING THEM FROM THE EASYPALLETTE**

▼ **GIF ANIMATOR PROVIDES EXCELLENT PREVIEW, TESTING AND EDITING FACILITIES**



but it's not 500pt. And, if you use the scale tool to adjust the size, its new size is not indicated in the type attributes bar.

Gif Animator is one of the better attempts to have been made at including this type of feature. Using layers rather than the more usual filmstrip approach, you can quickly produce animated banners using the scripted presets. A simple scrolling text banner can be produced in under a minute, and sophisticated builds and transitions are available from a plug-ins menu.

Next, we added some vector paths but were unable to delete them. Despite having the path tool selected, path mode set in the attributes toolbar and Edit Existing Path set on the edit button, selecting the path and then clear from the edit menu removed the background image, not the path. Possibly, we had failed to do something crucial, but it was not obvious.

**By contrast**, some things are remarkably simple. Entering text and applying effects is a relatively straightforward process, although you must rely on a plethora of menus, buttons and dialogue boxes. The text entry box couldn't be simpler. It's a box into which you type text, nothing more. Attributes are set on the attribute toolbar and a mode pulldown menu allows you to apply 3D effects such as round, bevelled and piped edges. The text remains editable after the effect has been applied, but again there are irritating inconsistencies in the interface. The type-size limitation appears to be 128pt. Enter a larger value, say 500pt, and the progress bar whizzes along and the text appears to get marginally bigger —

**Colour optimisation features** are the best you'll find outside of a dedicated package. An optimisation wizard takes you through the process, advising on creating a superpalette best suited to displaying the colours in every frame, overall colour depth and redundant pixel removal. You can then save these settings as a preset to apply to subsequent animations. You can preview your graphic either from within the application or your chosen browser. As a means of producing simple web animations in next to no time, PhotoImpact would be hard to beat.

### PCW DETAILS



**Price** £116.32 (£99 ex VAT)

**Contact** Bit UK 01420 83811

[www.ulead.com](http://www.ulead.com)

**Good Points** Loads of effects. Great gif animator.

**Bad Points** Inconsistent. Confusing interface.

**Conclusion** If you're into effects and web animation, the rest might be tolerable.

## Macromedia xRes 3



**W**hen it was launched, xRes' secret weapon was xRes mode, a fast way of displaying and manipulating big images without the need for loads of RAM. Version 3 has been with us for more than two years now, but despite this, xRes has a contemporary look and feel with which Photoshop users will feel completely at home.

One thing that has changed since we last looked at xRes is that you no longer get Mac and PC versions

on one CD. The version we had was for Windows only, so if you want cross-platform functionality, you'll need to shell out twice.

**xRes mode** achieves its speed by selectively processing only the displayed part of the image at the current screen resolution and saving editing operations as a command list which is applied at a final rendering stage. This provides almost instantaneous filter effects that conventionally would take minutes, even on a high-spec machine.

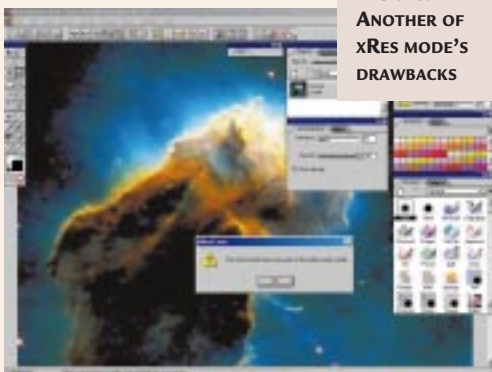
Problems arise, though, when the edit list builds up. Command-based operations such as zooming, panning, transformations and

cloning become slower with each edit you apply. To begin with, everything zips along nicely, but having done all the usual things you do in an editing session it takes progressively longer to display the image whenever you pan, zoom, clone or

carry out transformations. The only way around this problem is to render the image at frequent intervals, which uses up much of the time saved and has other disadvantages. You can use xRes in direct mode, of course, in which case it works conventionally on the pixel data at the time you make the edit.

**There is an** excellent range of art brushes, it supports floating objects, channels, masking and plug-ins, and a limited edition of KPT3 is included. There's support for HTML image maps and Shockwave, Macromedia's interactive dynamic web technology.

► **OOPS!**  
ANOTHER OF  
xRES MODE'S  
DRAWBACKS



### PCW DETAILS



**Price** £499 (£424.68 ex VAT)  
**Contact** Computers Unlimited 0181 200 8282 [www.macromedia.com](http://www.macromedia.com)  
**Good Points** Handles big files with small resources.  
**Bad Points** Old. Can slow to a crawl without proper management.  
**Conclusion** Looking neglected.

## Micrografx Picture Publisher 8



**M**ajor new features in version 8 of Picture Publisher include Light Studio, Bevel Factory, image warp, 72 pre-defined macros, multicolour gradients and anti-aliased tools. There is also Flashpix support, Kodak Digital Science colour management, two new merge modes and an enhanced image browser. Micrografx has also added a host of web authoring features. There's the ubiquitous image map,

web style wizards, gif animation, palette editing and HTML contact sheet output.

**Publisher's interface** looks a bit dated, but the combination of dockable toolbars and a context-sensitive modifier ribbon works well. Bevel Factory is a sophisticated button tool. You can apply straight bevelled edges to an object or choose from a variety of styles. In addition to controlling the light direction, a series of sliders provides control over width, smoothness, intensity, highlight brightness and shadow depth. In Light

Studio you can position spot, flood, directional or omni lights around an object. Sliders provide control over intensity, aperture setting and ambient light value. Tabbed palettes provide access to

bump mapping and effects, and preset lighting.

Publisher excels with its undo and macro capabilities. The Command Centre provides a chronological list of edits which can be selectively deleted, replayed, branched and grouped. The macro facility can be used in combination with low-resolution mode to provide a form of proxy editing.

Publisher provides a comprehensive feature set at a price well below that of the competition. But you don't get sophisticated interface design and the web features are not really worth the bother.

◀ **THE**  
COMMAND  
CENTRE  
PROVIDES  
SELECTIVE  
UNDO TO  
RIVAL  
PHOTO-  
SHOP, BUT  
IT'S NOT A  
FLOATING  
PALETTE



### PCW DETAILS



**Price** £79 (£67.23 ex VAT)  
**Contact** Micrografx 01483 747526 [www.micrografx.com](http://www.micrografx.com)  
**Good Points** Command Centre. Loads of effects and macros.  
**Bad Points** Web features are a bandwagon-jumping exercise.  
**Conclusion** Professional image-editing features at a budget price.

# Web authoring

Developers are falling over themselves to reposition their products as web authoring tools. The logic is clear. Tools which improve studio productivity are going to sell, because using one package to do a job instead of two or three is generally more efficient. A claim to be the hottest web authoring package around may amount to little more than support for gif and jpeg file formats — the least you could expect from an application costing several hundred pounds.

The most common web feature is an HTML image map generator. It works by assigning a URL to each object or layer in the image. An export filter then saves the image as a gif and generates the HTML code for a client-side image map.

Gif animation is another area of web

creativity ideally suited to image editors. It's simple enough stuff: a sequence of images displayed one after another in sequence with a timed delay between frames, sometimes on an infinite loop.

A good animator makes the task of producing the individual frames, linking them together, taking care of the timing, testing, editing and preparing for the web a quick and easy one. Where most fall down is

*Where most fall down is at the final hurdle, optimising the palette...*

at the final hurdle, optimising the palette so that each frame in the animation is displayed without ugly dithering or posterisation, and so that the file size is as small as possible.

**Ulead PhotoImpact** is excellent in this respect, providing an optimisation wizard which virtually does the job for

you, then provides data about size and estimated download times, together with a preview.

**PhotoImpact** has lots of timesaving features which enable you to create things like scrolling text and eye-catching transition effects, which is great if you're in a hurry or can't be bothered creating such things from scratch. Both **Corel PhotoPaint 8** and **Painter 5.5** have reasonable gif animators.

Corel offers good playback and editing features, and Painter's onion-skin feature, which lets you see subsequent frames beneath the top one, is handy for creating cartoon-style animations frame by frame. Neither, though, offers the speed or post-processing facilities of the Ulead product.

Another application which has an excellent gif animator at a budget price is **Paint Shop Pro 5**, which we reviewed last month's PCW [Group Test, p184].

## Table of features



PRODUCT	PHOTOSHOP 5.0	PHOTOPAINT 8	PAINTER 5.5	PHOTOIMPACT 4.2	xRES 3	PICTURE PUBLISHER 8
WEB EDITION						
MANUFACTURER	ADOBE	COREL	METACREATIONS	ULEAD	MACROMEDIA	MICROGRAFX
Contact no.	0181 606 4001	0800 973189	0181 200 8282	01420 83811	0181 200 8282	01483 747526
Web	www.adobe.com	www.corel.com	www.metacreations.com	www.ulead.com	www.macromedia.com	www.micrografx.com
Price inc VAT	£452.37	£351.32	£329	£116.32	£499	£79
Platforms	Win95/NT, Mac	Win95/NT, Mac	Win95/NT, Mac	Win95/NT	Win95/NT, Mac	Win95/NT
Layers/objects	✓	✓	✓	✓	✓	✓
Plug-in support	✓	✓	✓	x	✓	✓
Image spray	x	✓	✓	x	x	✓
HTML image maps	x	✓	✓	✓	x	✓
Gif animation	x	✓	✓	✓	x	✓
Natural media tools	x	✓	✓	✓	✓	✓
PS tablet support	✓	✓	✓	x	✓	✓
Vector paths	✓	✓	✓	✓	✓	✓
Multiple/selective undo	S	M	M	M	M	S
CMYK separation	✓	✓	✓	x	✓	✓
Spot-colour support	✓	✓	x	x	x	x
Alpha channels	✓	✓	✓	x	✓	✓
TWAIN support	✓	✓	✓	✓	✓	✓
Editable text effects	✓	✓	✓	✓	x	✓
Scripting	✓	✓	✓	✓	x	✓
Colour management	✓	✓	✓	✓	x	✓
Online tutorials	✓	✓	x	✓	x	✓

# Editor's Choice

A broad-brush picture of image editing packages for the professional.

Choosing a group-test winner usually involves much wringing of hands because nearly all packages are strong in some respects yet weak in others. When it comes to professional image editing packages, however, there can be but one choice. **Adobe Photoshop** stands out from the pack as the one application which continues to meet the needs of those at the cutting edge of digital photo manipulation, and is thus worthy of our **Editor's Choice**.

Firstly, Adobe's skill in the art of interface design means that it never takes long to find what you want and a little intuitive guesswork can take you far. With the release of version 5.0, Adobe has addressed most of the criticisms and fulfilled most users' feature wish list. The history palette provides a degree of flexibility which means you need never think twice before applying a filter or

making merry with retouching brushes, nor regret an earlier step which later turned out to be a wrong one. Users have long bemoaned Photoshop's lamentable text

capabilities but Editable text layers and layer effects will save hours, not only by making it easier to create text effects, but also by eliminating the need to start from scratch for even the most simple typographic alteration. Many

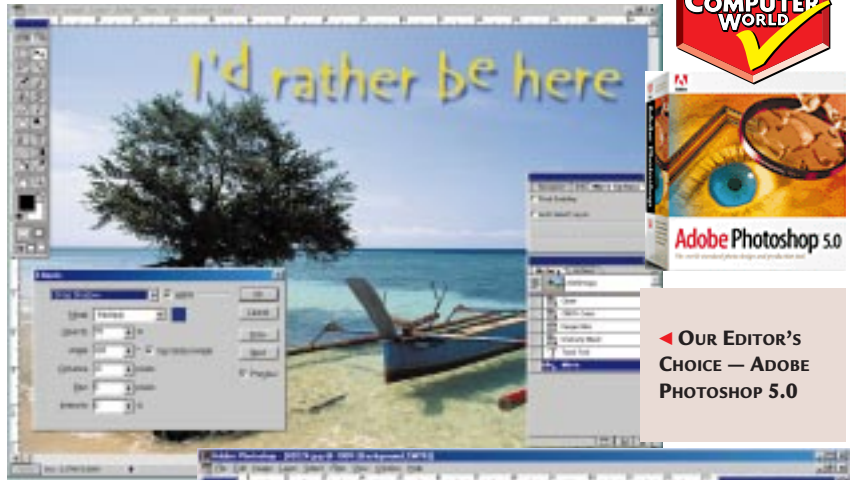
small but significant additions, from Pantone support to magnetic tools, live previews and colour samplers make upgrading to version 5 an urgent priority.

Of the remaining packages, all provide a good level of image processing and retouching features and effects, as well as general

graphics tools. However, with the exception of Painter 5.5 and PhotolImpact 4.2, the standard of web authoring tools is little short of mediocre. Only **Painter 5.5 Web Edition** has made a success of packaging its existing features (natural media brushes and effects) with web authoring facilities which do something useful. If you need to produce web pages consisting primarily of image segments, and especially if those pages make use of Javascript rollovers, we recommend you get hold of Painter 5.5 Web Edition. It is **Highly Commended**.

If there were an annual award for the most extras like free applications and so on, Corel would have it for keeps. But although freebies pull in home users on a budget, they don't cut much ice in the professional arena. Corel has gone as far as it can with features and PhotoPaint 8 is crammed full to bursting. Now all we need is an easier way to get at them.

• Screenshot images from PhotoDisc "Millenium" and "World Landmarks and Travel".



◀ OUR EDITOR'S CHOICE — ADOBE PHOTOSHOP 5.0



▲ PAINTER 5.5 WEB EDITION IS HIGHLY COMMENDED



Aureal's 'digital ear' enables **3D positional audio** using only two speakers. Ajith Ram listens in.

# Getting an earful

**T**here is a revolution coming to a PC near you. And it is a sound one. Following years of incremental developments, PC audio is taking off. About a year ago, this rather sedate area of computing was shaken up by a new standard, developed by Aureal Semiconductors. Its A3D standard helped sound cards to produce 3D surround sound through only two speakers, and this helped greatly to enhance the immersive environments in games.

**The next major step** in 3D audio is likely to come from Sensaura, a little-known British company which is set to make ripples in the audio pond with a host of brilliant innovations. Although less well known than its rivals, Creative Labs and Aureal Semiconductors, Sensaura's pedigree is second to none. The company is part of CRL (Central Research Laboratories), the former research arm of EMI Music. In fact, stereo technology itself was invented there in 1931.

Sensaura is promoting two technologies: Sensaura 3D audio and Macro FX. The latter can be considered to be an invention in itself as it has no comparable predecessor. Like the popular A3D standard developed by Aureal, Sensaura 3D positional audio is based on HRTF (Head Related Transfer Function) algorithms. These define the way in which sound from different directions interacts with our ears and head. The greater the accuracy of the HRTF algorithms, the better the surround sound effect. It is here that Sensaura has a critical advantage over rivals.

"When we started working," says Alastair Sibbald, chief scientist at Sensaura, "the commercially available plastic ears used to calculate HRTFs were not sufficiently accurate, so we were forced to design our own."

The human ear is an intricate organ. Every section serves to identify a particular sound. Therefore, to get accurate HRTF measurements, the shape of the plastic ear has to resemble its human counterpart as closely as possible.

**During his research**, Sibbald found common myths about HRTF measurements to be false. For decades it had been assumed that the actual material used to make the "ear" was



▲ **SENSAURA'S PATENTED DIGITAL EAR: SO FAR, IT REPRESENTS THE MOST ACCURATE REPRODUCTION OF A HUMAN EAR**

important. "We found that the materials themselves had no significant impact," Sibbald explains. "It is the *shape* of the ear that is important...", even the angle of the microphone used to simulate the ear drum. These findings resulted in Sensaura receiving a patent for its Digital Ear technology. So far, this Digital Ear is probably the most accurate reproduction of its human counterpart.

The accuracy of Sensaura's HRTF algorithms is evident in the quality of its 3D audio through two speakers. While most other technologies fail to reproduce sound directly behind the listener's head, Sensaura's 3D positional audio manages to do just that.

**Macro FX** is another Sensaura technology that is set to create a stir. Until now, all virtual surround sound technologies reproduced audio only at a set distance from the listener. Macro FX breaks this invisible barrier, making sound appear closer to the listener. Imagine a helicopter circling around and coming closer to you. As it gets closer, the volume and the quality of sound changes.

Previously, all virtual surround sound technologies made the helicopter seem as if it were a few feet in front of, or behind, you. But making it appear to be any closer proved difficult. With Sensaura's Macro FX, the same helicopter can be made to hover just in front of you or whiz right past your ear.

**The technology has tremendous potential in the music industry ... IMAGINE MADONNA MOVING AROUND YOU AND SINGING SOFTLY INTO YOUR EAR**

Additionally, characters in computer games can currently talk to you only from a set distance, but Macro FX allows them to come up to you and whisper in your ear. And, the technology has tremendous potential in the music industry, too. Imagine Madonna moving around you and singing softly into your ear.

Currently, the Yamaha Waveforce 192XG and VideoLogic SonicStorm Pro [review, next month] sound cards support Sensaura's 3D surround sound technology. Macro FX will be available in a driver upgrade later this year.

Toby Howard reports on an implant that is a **startling step forward** in the brain/computer interface.

## All in the head

Until recently, controlling computers by human thought was science fiction; now, it's rapidly becoming science fact. Researchers have succeeded in tapping directly into thoughts by implanting tiny electrodes into the brain. It's called "cognitive engineering" and it's mind-blowing. Attempts to use thought-power alone to control computers have traditionally used an electroencephalograph (EEG) to measure the brain's electrical activity. The patient wears a skull-cap studded with

**Bakay and his team are confident that the brain-computer interface will **ONE DAY TRANSFORM THE LIVES** of severely handicapped people**

electrodes, but because the skull muffles much of the neuronal chatter, the EEG records only large-scale activity when large groups of neurons fire together. It's rather like listening to the neighbours through the wall: you get the general gist but you can't hear all you'd like to.

The crux of the brain-computer interface problem is, how can individual thoughts be picked up? Much research focuses on signal-processing techniques to search the EEG traces for subtle changes in the cranial cacophony, but it's an inexact science. Just a few weeks ago came the startling announcement of a huge leap forward. Neurosurgeon Roy Bakay and his team at Emory University in Atlanta have developed a brain implant which can monitor extremely small-scale activity in the brain's motor area.

The implant is a hollow glass cone the size of a ballpoint pen's tip.

Called a "neurotrophic electrode", it's inserted via a hole drilled in the skull, into the cerebral cortex above the ear. The placement is crucial. Bakay's team scans the patient's brain using magnetic-resonance imaging, a non-invasive technique that displays computer-graphic images of blood-flow patterns. When the patient is asked to think of moving a limb, the motor area of the brain becomes active and from its increased blood flow the precise location of the

active region can be identified. This is where the electrode is implanted. Inside the glass cone is a microscopically thin gold wire surrounded by nerve tissue extracted from the patient's leg, which stimulates neurons from the surrounding cortex to grow into the cell. Over a period of months, the neurons fuse with the wire.

"It's like having a little piece of brain inside the electrode," says Bakay.

**Unlike previous generations** of brain electrodes, the implant needs no cabling. It receives its power from an induction coil sewn into a baseball cap worn by the patient. Any signal picked up from motor neuron activity is detected and amplified by a tiny receiver placed just under the skull. The patient subsequently undergoes a training programme using biofeedback. The electrical activity recorded by the implant controls the sound of a buzzer, and the patient gradually learns which thoughts make the buzzer sound louder and faster. Later, this buzzer is replaced by a cursor on a computer screen and the patient learns to "think" the cursor from side to side.

**Two patients** have so far received Bakay's implants. The first, who suffered from a fatal degenerative motor neurone disease, received her implants in 1997 and lived long enough to take part in preliminary experiments. "We learned a lot about the basic principles from her," says Bakay. "She helped us identify the brain cells we were looking for." The second is a 53-year-old stroke victim paralysed from the neck down, known as "JR". He has two implants, enabling him to separately control the horizontal and vertical movements of a cursor and select icons which trigger synthesised speech. For the first time since his stroke, JR can communicate. "If you can use a computer, you can talk to the world," says Bakay. The team are confident that the brain-computer interface will one day transform the lives of severely handicapped people, eventually enabling them to operate artificial limbs as easily as if they were their own.

**Cognitive engineering** is by turns fascinating and frightening. Where does the human stop and the machine start? If the brain-machine communication is two-way, could the machine control the person? Hypothetical questions for now, perhaps, but they might one day become very real.



▲ **ONE DAY, WE WILL BE ABLE TO CONTROL OUR COMPUTERS BY THOUGHT ALONE, VIA A SPECIAL BRAIN IMPLANT**



# hands on

## contents

**W**elcome to February's *Hands On*. We may still be in the depths of winter, but Roger Gann, being the tidy chap that he is, has already embarked on his spring cleaning. His *16-Bit* column this month contains all those **hints and tips** he has collected over the years and just dug out from under the bed or behind the cushions of his armchair. Ben Woolley, meanwhile, takes a second look at the development of **3D on the net**. Is Microsoft poised to capture this arena too, or will **Java** give it a run for its money? Have you ever wondered exactly what is a **firewall**? Or how it works? Our beginner's guide is here to help and Bob Walder investigates in *Networks*. Cliff Joseph, meanwhile, laments the fact that whereas PC users are spoilt for choice when it comes to hooking up a new printer, the iMac is somewhat forgotten. Perhaps **USB** is the answer...? As always, *Hands On* is the section of *PCW* which relies on you. Feel free to post your hints, tips and comments to the usual address, or email the columnists or myself directly.

NIK RAWLINSON, HANDS ON EDITOR

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Bob Walder talks firewalls — what they are, how they work, and how they can protect your business.

## PCW Hands On on CD-ROM

Now it's easy to find that *Hands On* tip, trick, advice or review again — there's a whole year's worth of columns on our monthly *PCW* CD-ROM. So if that handy hint is on the tip of your tongue, don't sit and sweat: the answer is at your fingertips.





# If the cap fips

Chris Bidmead covers partitioning with fips for **more memory**, and completes the installation.

**L**ast month, my mate Marcus and I were installing Redhat Linux 5.1 onto the extra half-gigabyte drive he'd added to his system for the purpose. But a disk-space shortage stopped us dead, so our best option seemed to be to shrink the existing Windows partition. Last month, in the *Hands On Unix* column, we looked at Partition Magic, but there's a free, traditional-software way to resize DOS partitions using the fips utility created by Arno Schaefer <schaefer@rbg.informatik.th-darmstadt.de> which is bundled with most Linux distributions. We found it on the RedHat 5.1 CD-ROM under the /dosutils/fips15c directory. (The older fips.exe directly under /dosutils is probably best avoided.) Beneath this is another directory, fipsdocs, which you should peruse carefully before proceeding. Fips has been in use for several years now and is probably as stable and reliable as any software working at this low level can be. But any utility that changes your partition table is potentially dangerous.

## Long division

**1 Fips reduces the size** of your DOS partition by changing some values in the partition table and boot sector. Before using it, you need to run a defragger, like the Disk Defragmenter which comes with Windows, to move all the spare space to the end of the partition. It's worth doing the defrag whether or not the Microsoft utility recommends it. The defrag exercise left us with 316Mb free space.

**2 Fips runs under DOS**, so we created a DOS system floppy with the fips files on it, following the instructions in the fips.doc file, and rebooted the machine. In a single-drive machine, fips pauses to let you read the warnings about not running it under a multitasking operating system, and then jumps into showing you your

```

Disk /dev/hda: 32 heads, 63 sectors, 524 cylinders
Units = cylinders of 2016 + 512 bytes

   Device Boot      #cyls   start   #end   blocks  Id  System
/dev/hda1             1         1       370   372920+  6  DOS 16-bit >=32M
/dev/hda2             *       371       371     524   155232  5  Extended
/dev/hda5             *       371       371     463   93712+  02  Linux native
/dev/hda6             464       464     524   61456+  02  Linux swap

Disk /dev/hdb: 32 heads, 63 sectors, 528 cylinders
Units = cylinders of 2016 + 512 bytes

   Device Boot      #cyls   start   #end   blocks  Id  System
/dev/hdb1             1         1       376   374976+  02  Linux native
/dev/hdb2             377       377     528   151216  5  Extended
/dev/hdb5             377       377     477   101776+  02  Linux native
/dev/hdb6             478       478     528   51276+  02  Linux native

```

◀**FIG 1** THE OUTPUT OF FDISK ON MARCUS'S MACHINE. LOOK AT THE START AND END CYLINDER LOCATION TO GET SOME IDEA OF HOW THE EXTENDED PARTITIONS, /DEV/HDA2 AND /DEV/HDB2, ACT AS CONTAINERS FOR THE LOGICAL PARTITIONS

**[FIG 2]**

```

/dev/hda1 (Windows) 364Mb /dev/hda5 ( / ) 91Mb /devhda6 ( swap ) 60Mb
/dev/hdb1 ( /usr ) 370Mb /dev/hdb5 ( /var ) 99Mb /dev/hdb6 ( /home ) 50Mb

```

partition table. With a two-drive machine like ours, fips pauses again before this to ask which drive we want to operate on. We chose the first drive and the appropriate partition table appeared — a useful check that we were looking at the right drive.

**3 As fips is about to change** your Master Boot Record (MBR), it first asks if you want to make a backup of this part of the hard disk. We said yes, and fips confirmed "created file a: rootboot.000".

**4 Fips then suggests a size** for the new partition. To leave some slack for Windows, we adjusted this downwards. The adjustment is made with the cursor keys, the screen showing you the increasing size of the Windows partition and then changing the cylinder position to start the new partition, as well as the size the new partition will be.

**That's virtually all** there is to it.

You receive the usual warnings before committing the new partition table to disk, but even then you can back out because you've saved the old partition table, and the restorb.exe utility is there to put it back for you.

Once that's done, you're ready to exit from fips, remove the floppy and start your Linux installation — or in our case, reinstallation. But first we rebooted to confirm that Windows was working correctly. A check with Windows fdisk [Fig 1] indicated that the partitioning had been carried out exactly as fips said, giving us an additional 150Mb which we decided to use for swap and /, the root partition.

## A cut above the rest

The new partition fips had created was marked as DOS 16-bit. When the reinstall brought us back to Disk Druid, we deleted and used the space to create two new partitions. We made /dev/hda5 60Mb and allocated it to /. This left 40Mb as /dev/hda6, which we reserved for swap. (In case you're wondering about the numbering, these are logical partitions which, under Linux, start with 5.) Using the Disk Druid "growable" partition property I mentioned last month, we ended up looking like Fig 2. We also used Disk Druid at this point to mount the existing Windows partition, /dev/hda1, on /mnt/win95. You can call this mount point (/mnt/win95) anything you like.

We followed the convention of putting the mount point under the /mnt directory and giving it a self-explanatory name.

## Smooth installation

After this, the installation proceeded as before. This time we didn't run out of space and we proceeded smoothly to the installation of the X Window System. The dialogue box asks you for the name of your video card and installs the relevant X server from the CD. The "X server" is the application which makes itself responsible for handling all your graphic primitives; it's nothing to do with a hardware server.

### Monitoring the issue

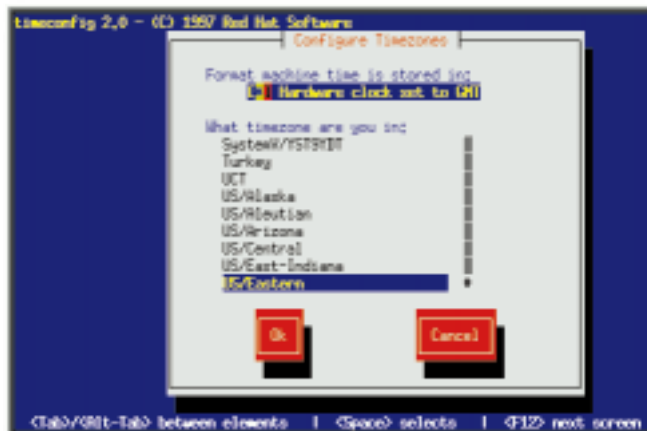
The next point, your monitor type, can be confusing if your particular monitor is not on the list. The X server takes its configuration for your system from a text file called XF86Config, in the /etc or /etc/X11 directory. The installation tried to write this file for us. It essentially needs to know the horizontal and vertical frequency ranges within which it can safely work without frying the monitor.

Monitors are extensively badged, so the name of yours may not be on any list known to Linux. We were using a badged Apricot 15in and Marcus suggested we tell the installation it was an NEC Multisync 3D. The Multisync model is six years old so the frequency ranges written to XF86Config are guaranteed to be fairly conservative.

Once you have a working X configuration and know a bit more about it, you can always edit the XF86Config file directly or re-run either of the X configuration programs, Xconfigurator or XF86Config.

### Time will tell

- We skipped the next step (installing the network) as Marcus wanted a standalone machine to start with, and moved on to setting the clock, or, more correctly, the relationship between the hardware clock and the Linux system [Fig 3].
- Then a few more questions: what services should be automatically started? This is a complicated subject, but for now you can just accept the defaults — the installation is intelligent about this and you can always change it afterwards [Fig 4]. If you want to query individual services, move the highlight to that service and hit F1.
- Configure printer? Impatient to get finished, we skipped this for now and



◀ **FIG 3** LINUX UNDERSTANDS TIME ZONES AND SUMMERTIME SHIFTS. TELL THE INSTALLATION YOU HAVE A HARDWARE CLOCK SET TO GMT (MOST PCs LET YOU DO THIS THROUGH THE BIOS) AND PICK A TIME ZONE FROM THE LIST SUPPLIED



◀ **FIG 4** ONCE YOUR X INTERFACE IS UP AND RUNNING, YOU CAN USE THE CONTROL PANEL TO CONFIGURE ELEMENTS OF THE SYSTEM YOU SKIPPED DURING INSTALLATION — NETWORKING, FOR EXAMPLE

moved swiftly on to the next screen, which invites you to set the root password [Fig 5]. Only a couple more steps to go now. The installation asks if you want to create a custom boot disk. A disk like this is handy for rescuing a fouled-up system, so yes, you want to create this disk, believe me!

- However, before this actually happens, you're moved on to the next question: "Where do you want to install the bootloader?" What you're setting up now is the actual boot sequence for the completed installation.



▲ **FIG 5** SETTING THE ROOT PASSWORD. WHATEVER YOU DO, DON'T MESS THIS UP UNLESS YOU ENJOY REINSTALLING!

### Hello, lilo

OK, take a deep breath. This is where a lot of installations go wrong. As I mentioned last week, the bootloader is lilo, a low-level, operating-system-independent utility that uses primitive BIOS calls to install the Linux kernel and kick the system into life. Lilo also knows how to boot Windows and other operating systems.

To boot Windows, it needs to know where the Windows partition is (in our case, on /dev/hda1). To boot Linux, it needs to know the device name of the root partition (/dev/hda5) and the location of the kernel. Unless these factors are right, your operating systems won't boot. In the past, I've always recommended



putting lilo on the boot sector of the Linux root partition, not the MBR. This is because Windows 95, if installed after another operating system, will helpfully “repair” the MBR to DOS standard, damaging lilo if it’s there, with baffling consequences for the beginner. However, Red Hat’s Disk Druid poses another problem with its penchant for creating logical partitions. The DOS MBR is a solid old standard, but it can’t do smart things like jump to a logical partition. So, if you tell the installation that you’d like to put lilo on the boot sector of the Linux root partition (in our case /dev/hda5), the DOS MBR will never find it. But you won’t discover that until you reboot!

I’ve argued with Red Hat’s techie, Donnie Barnes, about this but I can’t get him to see it as a problem. He thinks people should just *know* that the DOS



**▲ FIG 6 WHERE TO PUT LILO? IF YOU’VE USED DISK DRUID, THE MBR IS PROBABLY YOUR SAFEST BET**

MBR can’t cut it, and use another boot loader or put lilo on the MBR [Fig 6], being

careful not to let another operating system mess it up.

Anyway, the bottom line is that it’s probably simplest to tell the installation to put lilo on the MBR. The installation also allows you to include other operating systems you’d like to boot, so this was the point to mention, that we had Windows 95 on /dev/hda1.

What the installation is actually doing here is creating a configuration file called /etc/lilo.conf that tells lilo how to behave when it’s triggered by the boot sequence. When you know Linux and lilo better (you’ll find plenty of documentation on lilo under /usr/doc) you’ll be editing this file directly. The very, very important thing to remember is that lilo doesn’t use this text information directly. It first needs to translate the info into a form it can understand at the primeval, pre-file

## Installing Linux on a standard production PC

As Marcus drove off home with his dual-boot Linux/Windows 95 home-built machine, I moved on to my next project. The intention was to show how easily Linux can be installed on a standard current production model from a well-known manufacturer — the kind of machine I know many of you out there are using. Dell was happy to help out with a loan machine, and, by way of a change, I thought this time I’d use the S.u.S.E 5.3 Linux distribution.

Steve Jackson, Dell UK’s business manager for Servers, wanted to be absolutely sure his company’s product wouldn’t let me down, so he picked out a PowerEdge 2300 with a 350MHz Pentium II and 6Gb of hard disk; not quite the “standard model” for which I was hoping, but Steve was keen to supply a machine that had been “certified for Unix”. Dell machines of all sorts are happily running Linux all over the world, but Steve was taking no chances.

## If you knew S.u.S.E.

S.u.S.E. is a German-based company whose very solid Linux distribution is available on the same terms as Red Hat: you can get it free down the wire; very cheaply on CD; or reasonably cheaply, in a box with a manual. The boxed set comprises five CDs in a jewel case, a boot floppy, and an installation manual of almost 400 pages. Despite its somewhat quaint English, this manual makes a useful reference book for all flavours of Linux. With the official version of S.u.S.E you also get 60 days installation support. As with Red Hat, the UK supplier I’d recommend is John Winters, who runs the Linux Emporium at [www.polo.demon.co.uk/emporium.html](http://www.polo.demon.co.uk/emporium.html).

“There are two ways of installing S.u.S.E Linux,” says John, on his web site, “the one-page, 30-minute method [I tried it and it worked] or the rest-of-the-manual method which will give you as much detail as you could want on the intricacies of Linux installation. The actual installation process is handled by S.u.S.E.’s YaST [Yet Another Setup Tool] program which allows you to do both the original installation and later configuration.”

## Heaven and Dell

If Dell’s Steve Jackson hadn’t insisted on the PowerEdge, I don’t suppose there’d be much to write about at this stage. The ironic twist is that Steve managed to pick the one machine in Dell’s range that, as it turned out, won’t run current Linux versions right out of the box. Next month, I’ll explain the problem and the solution, and we’ll move on to installing networking.

system, pre-operating system stage of the boot process. To do this, you must run lilo at the operating-system level every time you change lilo.conf. Thankfully the installation process understands this, and at this point runs lilo for you automatically.

**And that’s it...** we’re done. The installation creates the tailored boot disk, and then you can remove the floppy and the CD and reboot your system. By default,

the reboot takes us into Linux because that’s how we set it up, but if we want Windows we just have to type “Win95” at the lilo boot prompt.

## PCW CONTACTS

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# Express delivery

Steven Helstrip takes a trip on board the Cakewalk Express, the easy-to-use **sound sequencing program**.

**M**aking music with a PC has never been so popular or so easy. But if you're new to it all, it can be difficult to know where to begin. If your PC is equipped with a sound card, all you need to get started is a sequencing program like Twelve Tone's Cakewalk Express, featured on this month's cover CD. And to help you start making music right away, we're going to show you everything you need to know, from setting up, through to recording and editing your own MIDI tracks.

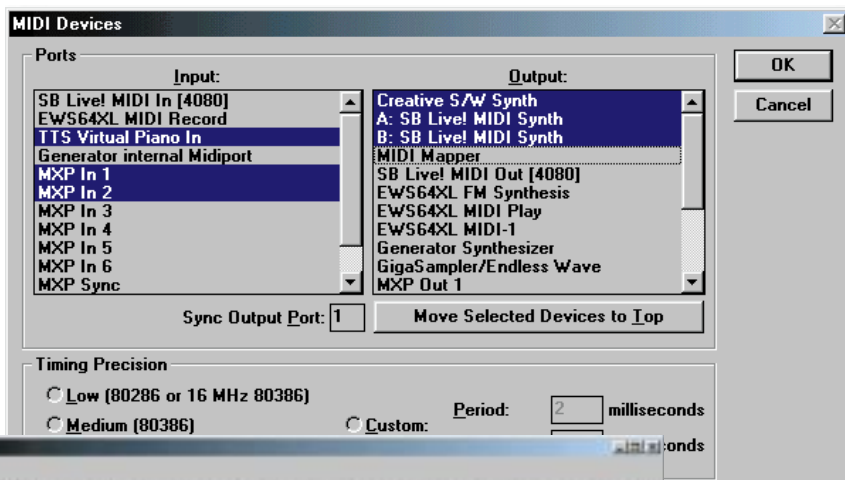
Although Cakewalk Express is an entry-level program, it does have some sophisticated features to offer. For example, it includes:

- **notation and piano roll** windows for editing your performances;
- **lets you balance** your recordings via an on-screen virtual mixing console; and
- **includes support** for MCI (Media Control Interface) commands, which means you can synchronise your music to video (.avi files) and integrate digital audio files (.wav) within your arrangements.

### 1 Installing Cakewalk Express

couldn't be easier — simply load-up this month's cover CD and follow the on-screen instructions. The setup program will install a Virtual Piano onto your system to allow you to use your PC's keyboard to play-in notes. You will need to restart your system before you can use it, though.

**2 Before running Cakewalk** it's a good idea to check that your sound card is set up to play back MIDI correctly, otherwise you won't be able to hear anything. The easiest way to do this is with the Windows Media Player, which can be launched by typing "mplayer" from the Start menu's Run command. First select MIDI sequencer from the Device menu, then load up a MIDI file



▲ THE MIDI DEVICES DIALOGUE (SETTINGS MENU) ENABLES YOU TO SELECT WHICH MIDI PORTS CAKEWALK SHOULD USE TO RECEIVE AND OUTPUT MIDI INFORMATION  
◀ THE VIRTUAL PIANO ALLOWS YOU TO ENTER NOTES INTO CAKEWALK USING YOUR PC'S KEYBOARD AND MOUSE

(\* .mid). If there are no MIDI files on your PC's hard disc, then check out the ones on this month's cover CD.

**3 If the tune plays back** smoothly, you're almost ready to start making music of your own. If nothing is heard, the most probable cause is that MIDI playback is turned down, or muted, in your sound card's mixer applet or control panel. You can launch the mixer by double-clicking on the speaker icon in the Taskbar. If it isn't there, go to Multimedia Properties in the Control Panel and tick the box marked Show Volume Control on the Taskbar.

**4 To achieve** the best possible signal-to-noise ratio (less noise, more sound), ensure that the volume controls for MIDI and master levels are set to maximum. And if you want to go the whole hog, why not hook up your sound card to a hi-fi system? To do this, simply connect the line output of your sound card to your hi-fi's auxiliary input. If your hi-fi doesn't have auxiliary connectors, try the tape input instead.

**5 When Cakewalk loads** for the first time, the MIDI settings dialogue will start automatically. This enables you to choose which MIDI devices Cakewalk should use to receive and output MIDI information. You'll need to select at least one MIDI output — preferably your sound card's WaveTable synthesiser —

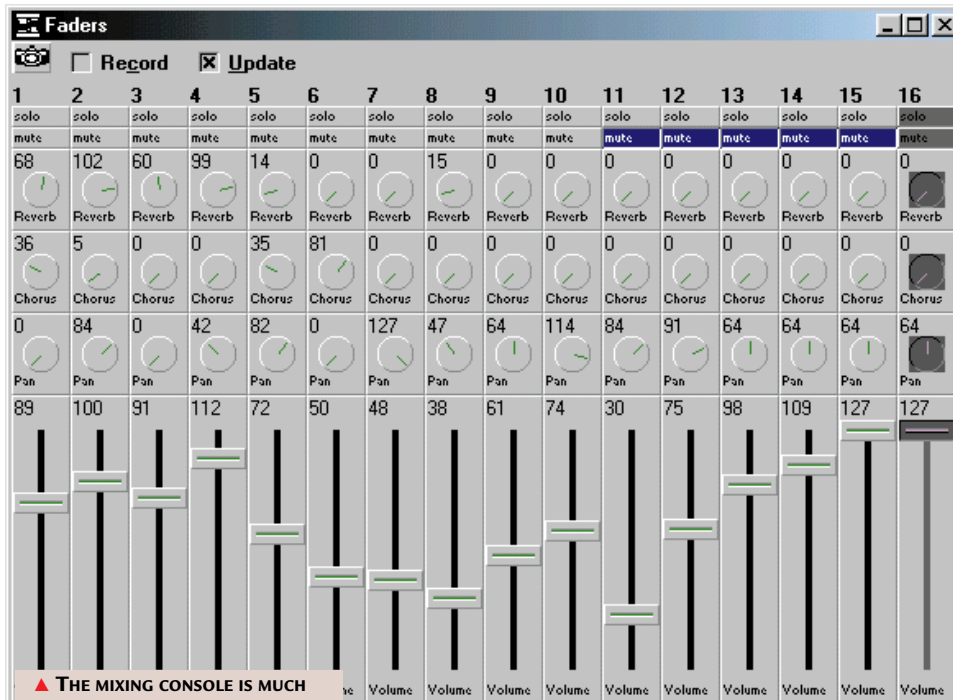
and an input device. If you don't have a MIDI keyboard connected to your PC, don't worry: just choose the Virtual Piano driver (TTS Virtual Piano In).

### Take in the view

The Cakewalk screen is divided into three main areas: the Control bar, the Track view and the Measure view [Fig 1, page 242]. The default screen layout also includes the Notation window, which can be used to insert and edit notes. If your music theory is a tad rusty, you may prefer to use the Piano Roll view instead.

➤ **The Control bar** sits along the top of the screen and provides buttons for some of the more frequently used commands like the transport controls (play, rewind, record, etc.). We'll look at the other main features in more detail later.

➤ **The Track view** is where settings are made for each track, such as which MIDI channel a part should play on. It is also possible from here to select an instrument for each track, change its volume and position it somewhere between the left and right speakers, which is known as "panning". To select a track parameter you can either click on it with your mouse, or navigate with the cursor keys as you would in a spreadsheet. Most parameters in



▲ **THE MIXING CONSOLE IS MUCH EASIER TO USE THAN STANDARD TRACK PARAMETERS. IT'S IN THE VIEW MENU**  
 ► **CAKEWALK'S PIANO ROLL VIEW ENABLES YOU TO EASILY ENTER, DELETE AND MOVE NOTES AROUND**

Cakewalk can be changed in one of three ways: double-clicking on a value enables you to key-in a number; you can use the +/- keys on the numeric keypad to step up and down incrementally; or, if you prefer to work with just the mouse, click and hold the left button on a parameter and drag your mouse up or down.

► **The Measure view** is where recorded parts are displayed, arranged and often rearranged once you have a tune you can work with. Single measures can be selected for editing just by clicking on them, or you can highlight multiple measures on several tracks for editing larger sections of a song.  
*Tip: you can jump between Track and Measure views with the Tab key.*

## Getting started

Now that we know about the basic features of the program, it's time to face the music.

**1 To get a feel** for how Cakewalk works, load the file prelude3.wrk. The File Information dialogue will appear to let you know who wrote the piece (in this case, JS Bach, although I'm sure he didn't program it personally). This is followed by a second dialogue that says

"File has System Exclusive auto send banks. Send them now?" Answer yes to this. To play the sequence, simply press the space bar or click on the play icon.

The piece is set up to play back on a harpsichord, as it would have been in Bach's day. The instrument can easily be changed, though, by clicking in the Patch column. Why not hear what it sounds like being played by a sitar, or even bagpipes? Give the volume and pan parameters a tweak as well, which are the next two columns to the right.

**2 The tempo, or speed** of the piece can be altered by clicking the Tempo Offset display on the Control bar. A dialogue box will pop up, from where you can enter a tempo in BPM (beats per minute) or use your mouse to tap-in a tempo. The three buttons beneath the Tempo display change the tempo ratio. By default, these are set to 0.5, 1 and 2 times the current tempo setting. They're really useful if you want to fast forward

to a particular part in your arrangement, like you would with a video recorder, or you need to hear a part played back slowly. You can modify the ratios by clicking on them and entering new values. Note that if you're recording a track that is too difficult to play in real-time, find a tempo you are comfortable with and store the setting as a tempo ratio for later use.

**3 The staff icon** to the right enables you to set the key and time signatures, and the icon furthest to the right is the Panic button. Clicking this stops playback and sends note-off messages, and other reset commands, to every MIDI device. It's particularly useful

when notes continue to play, or hang, even after you've pressed Stop.

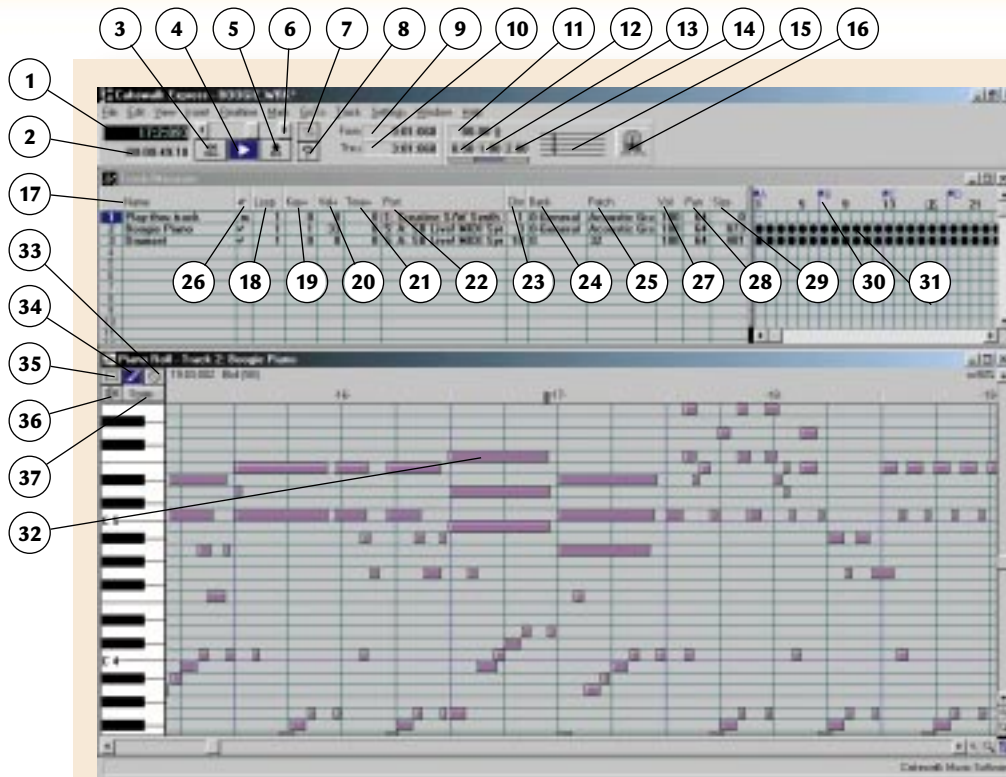
## From the top

If you have a MIDI keyboard connected to your PC, you should be able to play and record straight into Cakewalk. For those of you without, the next best option is to load up the Virtual Piano (Ctrl-K). You may find it easier to work with the two programs simultaneously if the "Always on top" option is enabled in the Settings menu.

## Keyboard shortcuts for Cakewalk

Keyboard shortcuts can help you work more efficiently with Cakewalk. Here are the most common ones, which include transport and locator commands.

Play/Stop	Space
Record	R
Rewind to Start	W
Rewind	Ctrl-Page Up
Fast Forward	Ctrl-Page Down
Virtual Piano	Ctrl-K
Step Record	Shift-F3
Go to start of selection	F7
Go to end of selection	F8
Set start of selection	F9
Set end of selection	F10



**FIG 1 A WALK THROUGH CAKEWALK**

- 1 CURRENT SONG POSITION, BARS: BEATS: TICKS
- 2 CURRENT SONG POSITION, HR: MN: SC: FR
- 3 REWIND TO START
- 4 PLAY
- 5 RECORD
- 6 SONG POSITION SLIDER
- 7 STEP RECORD
- 8 HELP
- 9 CURRENT SELECTION START POINT
- 10 CURRENT SELECTION END POINT
- 11 TEMPO
- 12 PLAY HALF TEMPO
- 13 PLAY CORRECT TEMPO
- 14 PLAY DOUBLE TEMPO
- 15 TIME AND KEY SIGNATURE
- 16 PANIC BUTTON (ALL NOTES OFF)
- 17 TRACK NAME
- 18 NUMBER OF TIMES THE TRACK PLAYS

- 19 PITCH TRANSPOSE
- 20 VELOCITY OFFSET
- 21 DELAY OFFSET
- 22 MIDI OUTPUT PORT
- 23 MIDI CHANNEL
- 24 BANK SELECT
- 25 PATCH (INSTRUMENT SELECTOR)
- 26 TRACK MUTE/ENABLE
- 27 MIDI VOLUME
- 28 PAN
- 29 NUMBER OF EVENTS THE TRACK HOLDS
- 30 TRACK MARKER
- 31 MEASURE CONTAINING DATA
- 32 MIDI EVENT
- 33 ERASE TOOL
- 34 INSERT/DRAW TOOL
- 35 SELECTION TOOL
- 36 SCRUB TOOL
- 37 SETS SNAP VALUE

In addition to pitch bend and modulation, the piano has a sustain pedal feature that is activated by holding down Shift.

**1 Each MIDI port** provides 16 discrete channels for playing-back instruments, and only one instrument patch may be selected on each. This doesn't limit you to just 16 tracks, however; any number of tracks can be assigned to the same MIDI channel.

The exception to this rule is drum and percussion parts, which are configured to receive on MIDI channel 10, since each key has a different instrument assigned to it.

**2 To record a part** into Cakewalk, first select an appropriate instrument on the track that you want to record to. After pressing the record button, or R on the keyboard, wait for the Metronome count-in of one bar and off you go. Don't worry if you make a few mistakes at this stage, because you can easily edit them out later on.

**3 You can correct** any timing errors by applying quantise from the Edit menu. It works by moving notes to the nearest sub-division in a musical bar. The number of divisions is determined by the quantise resolution, which is

selectable between a whole bar, right down to a 32nd note. For a less rigid feel, reduce the quantise strength to around 50 percent.

**4 There are four** editing windows available in Cakewalk Express, which are launched via the View menu or by right-clicking in the Track view. We only have the space to cover the Piano Roll view here, but don't forget to try out the others.

**In the Piano Roll view** the mouse is used for entering, deleting and moving notes around. It's all very intuitive, so it doesn't need too much explaining. The screen is split into two sections: the lower half displays note-on velocities (how hard each key was struck), while the main area shows the notes themselves. Bars and beats are shown across the top of the screen similar to the Measure view, and pitch is represented by the piano keyboard in the far-left column. When you first open the Piano Roll, the note velocity pane is hidden at the bottom of the screen. To view it, drag the horizontal dividing bar upwards.

The Draw tool (pencil icon) is used to insert, lengthen and change the pitch of notes by dragging them around the screen, and you can right-click on a note to modify its properties. Notes will always "snap" to the

current grid resolution, which is selectable from a whole note through to individual ticks (120 ticks = a quarter note).

**If you want to know more** about using Cakewalk, check out [www.ping.at/users/akainz/midimani.htm](http://www.ping.at/users/akainz/midimani.htm) for further tips, tutorials and links to other useful sites.

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# Fools rush in...

The net is changing fast, so **tread warily**, warns Nigel Whitfield, or your wallet might suffer.

**D**uring the past year there has been plenty of change on the internet, with new domains like .to, .am and .tv creeping into more URLs and the US government finally disentangling itself from the way the net is managed. Laws to keep track of personal data and to regulate spam are starting to crop up. It is becoming cheaper to get online, and, court cases or slanging matches notwithstanding, browsers are becoming simpler and more natural to use.

Sit down for a moment, and you could probably think of some of your own personal milestones for the internet over the past year. Would you include RealPlayer G2, or Dixons' FreeServe, or perhaps the iMac? Or events, rather than technology, such as the Starr Report?

We may live in interesting times, yet this is viewed as something of a curse by many people. On the internet, times are often interesting, and the pace of social and technological change is

breath-taking. As always, when it comes to technology, interesting times can be costly, too. Many people may find that out, literally to their cost, over the next year or so.

**Hard on the heels** of the BT Highway services which, despite the high charges, seem to be quite popular, BT has launched trials of its Interactive Network, which uses a technology called ADSL to deliver speeds of up to 2Mbps over an ordinary copper line. The present trial is limited to a small part of London, but more interesting is the cost: around £30 per month. There's no guarantee that we'll all be able to have high-speed connections to the internet *that* cheaply, but it could make for some interesting shifts in the pricing of net services.

If you were to believe the hype, then 1999, like so many other years, is also likely to be the year in which cable modems finally take off. This time it might even happen, if companies such as Cable & Wireless use digital television as a lever to deliver other services.

**This is all good news**, of course.

However, it's also likely to be extremely annoying for those who have recently signed five-year contracts for such services as ISDN or Kilostream circuits, only to discover that something much faster is just around the corner, and at a much better price, leaving you with penalty clauses to read through while you wait for your downloads to finish. Besides the net itself, it looks as if the way in which we connect could be about to change dramatically in 1999.

**What can you do?** Just look. Don't rush, and, most important of all, do not commit yourself to a long-term contract. Take the plunge too quickly, and while you might be the first person on your block to connect at 128Kbps, you might also be the *last* person left connecting slowly while everyone else has moved to cable modems.

Interesting times indeed. And for the unwary, or the hasty, a wrong move could prove a costly curse.

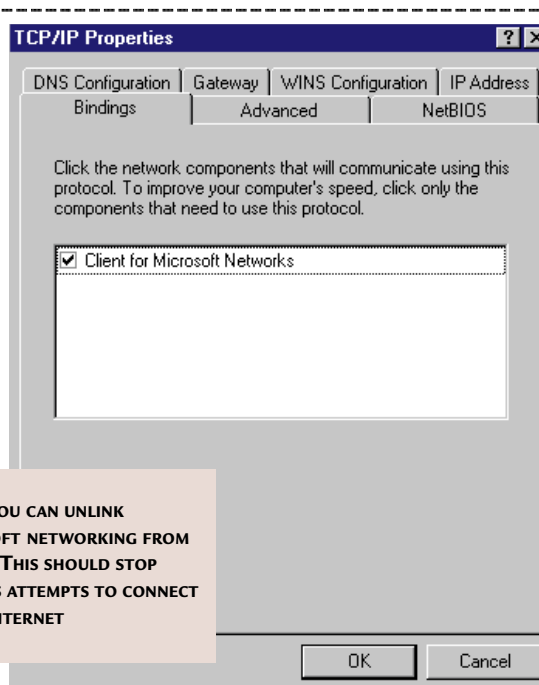
## Questions

### & answers

**Q** Ever since I upgraded my MS Dial-Up to version 1.2, the "Dial-Up Connection" keeps popping up (uninvited) from time to time. I use Netscape Communicator 4.07. Is there a simple cure?

**a** There are two possible causes of this. One is the Netscape Mail Watcher, a small program that checks your mailbox intermittently so you can be quickly alerted to messages. You will see this running

*because its icon appears at the bottom right of the screen, in the system tray. You can click on it with the right mouse button to close it. However, unless you have also recently installed or upgraded the browser, this is not the most likely culprit. That's more likely to be Microsoft Networking, which has a rather anti-social habit of sniffing around all the time to discover other systems to which it could connect. Although this is acceptable on a closed network, if you have a link to the rest of the world, either using Dial-Up networking or*



**► Fig 1** You can unlink Microsoft Networking from TCP/IP. This should stop spurious attempts to connect to the internet



### Questions

### & answers

a router with an ISDN connection, you can end up with lots of extra connection attempts and, in the latter case, with a large phone bill since the router will be silently connecting to your ISP while you are unaware. The solution is to tell your system not to use TCP/IP for the Microsoft file and print-sharing services, and to make sure that the Dial-Up adaptor is set only to use TCP/IP. Right-click with the mouse on "Network neighbourhood" and you'll see a list of adaptors and protocols, and various configurations.

● If you want to use Microsoft Networking without TCP/IP, you'll need to make sure you have the NetBEUI protocol installed. Make sure it's linked only to the ethernet card, if you have one in your PC.

Click on the TCP/IP link to the Dial-up adaptor, press the "Properties" button and select the Bindings tab [Fig 1, p245]. If Client for Microsoft Networks is listed, clear the check box next to it to stop the spurious connections. ● If you don't have a network card in your computer, the simplest solution is most likely to remove the Client for Microsoft Networks.

**Q** My ISP has upgraded its service to shell access to its Unix systems. I know you can set Unix systems to pretend that one page is another (e.g. index.html is really html/front/index.html). What do you use for shell access? What other commands are available?

**a** First, the easy bit. Accessing a system for shell access is simple: you need a program which supports the Telnet protocol, and there is one built in to Windows, in fact. All you need to do is choose "Run" from the Start menu and type telnet shellhost.someprovider.co.uk — or whatever is the name of the system on which you have been given an account. It's enough to get you started, but it's also not a very good Telnet program, as it lacks some features and has a vt100 emulation which seems slightly at odds with what some Unix systems expect. Fortunately, there are plenty of other Telnet programs around and you should be able to find one that suits your needs. For Mac users, NCSA Telnet

### You need a program which supports the Telnet protocol

will fit the bill. If you want to find out about Unix, the best thing is to refer to one of the simple text books for newcomers: something like O'Reilly's Unix in a Nutshell is a good place to start. You should also browse the back issues of PCW if you have the CD-ROM [see p308], where you'll find a brief summary of some basic Unix commands in a previous Hands On Internet column. Finally, on the subject of how web space interacts with Unix systems, as with most things where Unix is concerned, there's more than one way to do it. Very often, the redirection is handled in the web server itself which means you won't be able to change it. But there's a similar effect that can be gained using links,



► FIG 2 HIDDEN WITHIN WINDOWS — THE INTERNET EXPLORER FAVOURITES

or symbolic links, which are just like the shortcuts in Windows or aliases on a Mac. You can create a link on Unix using the ln command. For instance, if I were to type the command

```
ln -s /usr/local/src /home/nigel/src
```

a link called /home/nigel/src would be created, which would act as a directory; changing to it would actually put me in the directory /usr/local/src. The -s option makes it a symbolic link; a pointer to a file, which can be on a different disk. Omitting that option creates a hard link which is another directory entry pointing to the same file. In effect, the file has two names, rather than a name and an alias. With a hard link, the file is not deleted until you have deleted all the links to it. With a symbolic link, deleting the file at the end of the link prevents all the links from working.

**Q** Where are all the files for Outlook Express stored? I want to retrieve email from a backup tape. Also, where do I find the Favourites for Internet Explorer?

**a** Let's begin by dealing with the Favourites part of your question. Favourites are the easiest to find and you will discover them in the Windows\Favourites folder. Just restore this folder, in addition to its sub-folders, and your old Favourites should reappear [Fig 2]. Outlook and other Microsoft mail programs store messages in a mail file and a personal address book file. The former type of file has the extension .pst and may simply be called Exchange.pst. Or, it may have a name corresponding to a user profile if your system is set up with more than one profile. Your address book is in the corresponding .pab file, so you need to restore both of these from tape and then either use the Import option in your mail program, or the Inbox Setup Wizard, creating a new name and then specifying the files you recovered from tape, in place of the default.

### PCW CONTACTS

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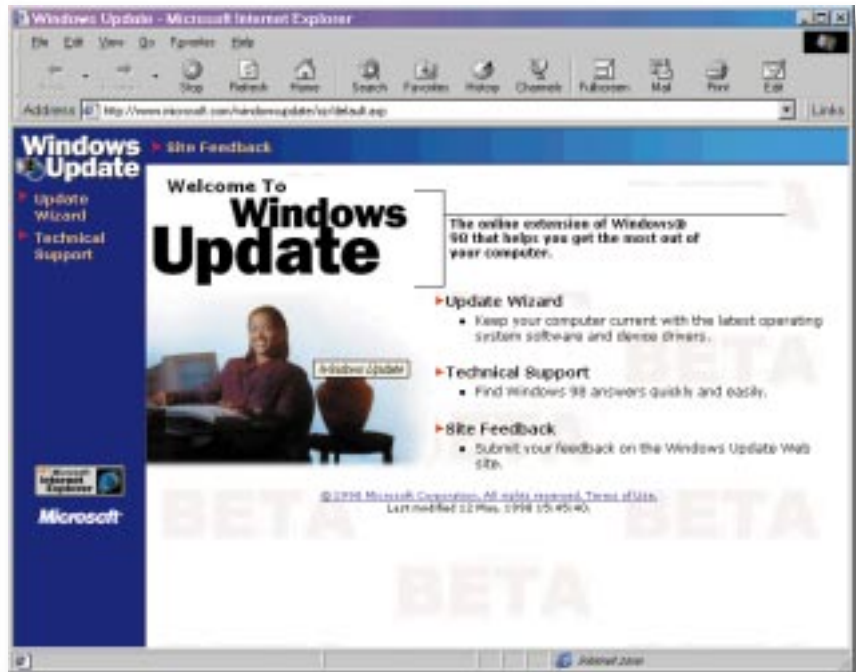
# All right now

**Tim Nott has a cure for those Windows update blues.**

**O**ne of the things that makes life a lot easier in Windows 98 is the Windows Update tool. This connects you to the Microsoft web site and checks your system to see if there are any updates or patches you should have.

All very user-friendly, but it does have its oddities. One is that on several occasions when I've visited, it has been slow to the point of stasis. Another is that the automated approach, which downloads and installs updates without further user intervention, has the shortcoming that it doesn't seem possible to keep the downloaded setup files. So, if you want to re-install Windows 98 for instance, you have to start all over again to obtain the updates. Worse still, if you have a number of PCs to update, it seems you have to go through the same process for each.

**Internet tools** are not really in the province of this column but I'll make an exception for GetRight, which is a tool for managing downloads. What makes it relevant to this column is, as Mike Insley



points out, that it gets around this problem. GetRight, which at the time of writing was available from [www.download.com/PC/Result/TitleDetail/0,4,0-21523-g,501000.html](http://www.download.com/PC/Result/TitleDetail/0,4,0-21523-g,501000.html) (phew!), will intercept the download and save it to your chosen location, although the MS Update site itself will report an unsuccessful download. Mike adds that he can't get it to work with the Netscape

Smart Update site, so if anyone out there can help him, please let me know.

### It can be done!

This is starting to become a habit, but here's another "can't be done" solved. We've had the one-stop-close-down-Windows tip several times. The last sighting was in the July '98 column,

## YOU CAN STAY AT THE PCMCIA

**S**imon Abraham mailed me from the Gambia with a power management problem in Windows 98: whenever he tried to use a PCMCIA modem from his notebook, it would take several seconds to "wake up" the power to the card, during which time the mouse pointer was also frozen. These devices are now more commonly known as PC Cards, because People Can't Memorise Computer Industry Acronyms.

In Windows 95 there is an option in Control Panel to have PC Cards permanently on, but this has disappeared in Windows 98. Although the visible control has gone, the

underlying Registry setting remains. Back up your Registry, run Regedit and go to HKEY\_LOCAL\_MACHINE\System\CurrentControlSet\Services\VxD\VCMM. You can then set the value of EnablePower-Management to 00 00 00 00.

This did the trick for Simon, who was so pleased that he wrote a utility to do this automatically and won himself a book token. I've included his file on our cover-mounted CD as PCMCIA Power



**▲ SIMON ABRAHAM'S UTILITY RETURNS PC CARD POWER TO WINDOWS 98 USERS**

Manager.zip. Although the file has been scanned with the latest Dr Solomon's virus scanner, it has not been extensively tested. Use it at your own risk, and if you have any queries, contact Simon, not me.





## Questions & answers

**Q** Is there a way to determine the make of display card I have, without opening up the case?

GERALD ROSSI

**A** There are two ways. Firstly, when you switch on the PC, the first message you see on the screen should contain information about the display card. But sometimes this disappears too quickly to see, or may have gone by the time the monitor has warmed up. A second, better, method is to open a DOS session within windows and type debug  
dc000:0 100  
This will produce a "dump" of memory on the screen in hexadecimal, with the corresponding characters in a column to the right [Fig 3]. Most of the latter will be gibberish, but somewhere

be done, type "?" to list all the possible commands. You are on your own, now. This column takes no responsibility for self-inflicted injuries.

**Q** Would it be possible for you to include the latest version of TweakUI for Windows on your next cover disc? I do not have internet access at home, so I can't download it from Microsoft.

JOEL STANFORD

**A** TweakUI is included in Windows 98, though you do need to dig it out manually. Go to Tools\Reskit\PowerToy on the Windows 98 CD-ROM, right-click on Tweakui.inf and select Install. For Windows 95 users, and in answer to your question, that's a good idea, Joel, and you'll find PowerToy.exe in the Hands On section of this month's PCW CD-ROM. Copy this to a temporary folder on your hard disk, then double-click on it to expand the contents. This includes not just TweakUI, but various other goodies which are all documented in the Readme.txt file. Note that

Philips CD-RW (internal SCSI) drive. This attempts to load while Windows is starting, and more often than not causes the computer to crash irretrievably.

NICHOLAS DELIYANAKI

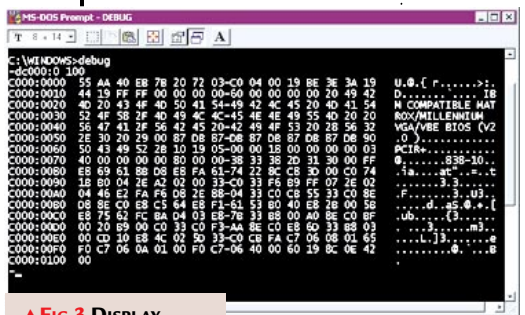
**A** I don't know about the Adaptec software nor why it should cause the system to crash, but I can tell you where to look for it apart from the Startup group. First, look in the file WIN.INI in the Windows folder. It's a plain text file you can edit with Notepad. In the first section there may be two entries: LOAD= and RUN=. The first starts any program(s) listed to the right of the equals sign minimised, the second starts them normally. Next, look in the Registry. Start Regedit.exe and go to HKEY\_CURRENT\_USER\Software\Microsoft\Windows\CurrentVersion and look for keys starting Run, Run Once, RunServices and similar. Repeat for the corresponding branch and key under HKEY\_LOCAL\_MACHINE. Windows 98 users, as mentioned in a recent edition of the Hands On Windows column, have a much more elegant way of controlling all this from the System Configuration Utility, which you can find in the Tools menu of the System Information accessory, or by running MSCONFIG.EXE.

**A** I always have a twinge of conscience about answering this sort of question, which could be used for nefarious ends. But on balance, if there is a hole in security, people are going to find it anyway and those who rely on such security measures should be aware of their shortcomings so that more appropriate measures can be taken. So, if you start Regedit and go to HKEY\_LOCAL\_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Policies\Ratings, you'll find a binary value named "Key". Delete this and you'll have a blank password. You will then be able to get in to the Content Advisor settings again.  
• Special thanks to Jason Ozin for helping out with this one.

**Q** In November's column you mentioned installing Windows 98 from scratch, rather than upgrading a 95 installation. I'd like to do this on a freshly formatted hard disk, but my Windows 98 CD-ROM states that it's an upgrade.

DECLAN GILBERT

**A** No problem, provided you have a "qualifying product" from which to upgrade. At some stage the Windows 98 installation will ask for this. You'll need to put a Win95 CD-ROM in the drive or show the floppy drive a few Win3.1 disks. Make sure you have a bootable floppy disk with CD-ROM drivers on before you burn your Win95 boats, though.



**▲ Fig 3** DISPLAY-CARD SECRETS REVEALED WITH DOS DEBUG

there will be a text string describing the card. Typing "d" (dump) a few more times may well produce further information, and "q" (quit) will exit debug. Do be careful using debug; it's a programmer's tool that can be used to write to, as well as read from, memory, and hence can crash your PC in a variety of fascinating ways. Stick to the dump and quit commands, but if you want to see what can

you can install the lot by right-clicking on Install.inf, or piecemeal from the individual .inf files.

**Q** How can you prevent an application from loading automatically when Windows 95 is started? I don't mean the ones in the Startup group, all of which I have removed. The particular application is Adaptec's Direct CD which allows direct access to a

**Q** I put a password in Control Panel, Internet, Content, Enable Content Advisor, thinking this was a good idea with young children around. But I have now forgotten the password. Is there any way of changing it without first knowing it?

TIM ROGERS

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# Pearls of wisdom

Having trouble with your favourite OS? Roger Gann makes it look easy with six simple DOS tips.

**T**his month's column is exclusively devoted to a pot-pourri of hints and tips I've collected over the years. So in no particular order, here they are. Have fun!

## 1 Chain of COMMAND.

COMMAND.COM is the command line interpreter for DOS. Its job is to interpret everything you type in at the C:\> prompt (aka the command line) as a command and does its best to obey. It's an unusual program because, if you run another program, it cuts itself in half, kicking half of itself (the so-called "transient" portion) from memory, to free up conventional memory for use by applications. It does this because you won't be able to access COMMAND.COM from within an application (unless it loads a second copy of it) and so isn't needed.

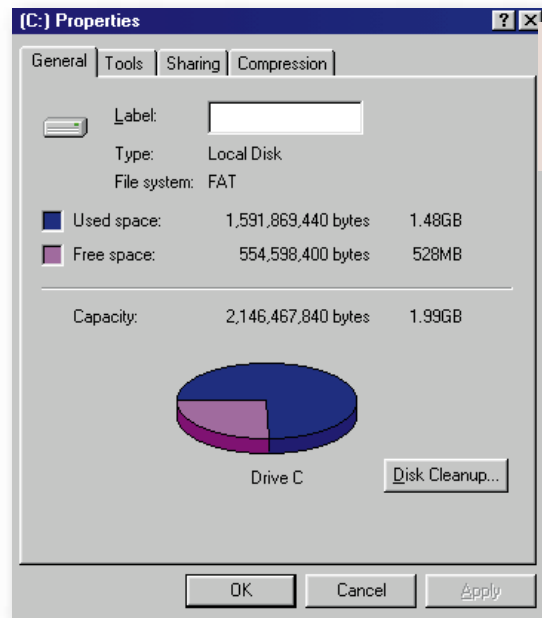
**So, when you quit** your programs, or "shell out" to MS-DOS, the command interpreter, COMMAND.COM, needs to be reloaded from disk. To speed up the process of reloading the command interpreter, you can store COMMAND.COM on a RAM Drive. To do this, follow these steps:

- ➔ **Add** a DEVICE=RAMDRIVE.SYS in your CONFIG.SYS.
- ➔ **Add** a line to your AUTOEXEC.BAT that copies COMMAND.COM to the RAM Drive.

*For a year or two many PCs were shipped with both types of floppy-disk drives*

- ➔ **Set** the COMSPEC environment variable (in AUTOEXEC.BAT) to "point" to the copy of COMMAND.COM on the RAM Drive.
- ➔ **Set** the PATH environment variable (in AUTOEXEC.BAT) to include COMMAND.COM's location on the RAM Drive.

The lines in AUTOEXEC.BAT will



**← HARD DRIVES ARE GREAT, BUT RAM DRIVES ARE FASTER**

two different-sized floppy disks if you install DRIVER.SYS with the appropriate switches in your CONFIG.SYS file. Simply add this line to your CONFIG.SYS:

```
DEVICE=DRIVER.SYS /D:0 /F:1
```

Then, when you reboot, you'll see this message when the driver is installed:

```
Loaded external-disk driver for drive <x>
```

where <x> is the new

look like this:

```
COPY C:\COMMAND.COM D:\
SET COMSPEC=D:\COMMAND.COM
SET PATH=D:\;
```

(followed by the rest of your normal path description).

**2 Share and share alike.** For a year or two many PCs were shipped with both types of floppy-disk drive, 5.25in and 3.5in, which made copying one floppy disk to another a piece of cake. However, for the past decade or so PCs have been shipped with a single 3.5in floppy-disk drive only, which can make copying a disk slightly awkward. OK, it's easy enough to copy an entire floppy disk if you only have one floppy-disk drive; DISKCOPY takes

care of the problem for you. But supposing you wanted to copy a file from one 3.5in disk to another, but you had both 3.5 and 5.25in floppy-disk drives?

Ordinarily, you'd have to copy it on to the hard disk, swap disks, copy it from the hard disk and erase the copy on the hard disk. Yet it is possible to use one floppy-disk drive to copy a file between

logical drive letter associated with drive A. You can then use the single floppy-disk drive and the MS-DOS COPY command to copy files between disks (swapping disks when prompted), as in the following example:

```
COPY A:FILENAME.EXT X:
```

DRIVER.SYS is only needed if you have two different, and possibly incompatible, floppy-disk drive types; however, you still need to use two floppies of the same media type (for example, 360K to 360K). Note that you can't use DRIVPARM — this only modifies an existing drive without adding that vital extra drive letter.

**3 The sub's bench.** While the number of files you can store in a root directory is strictly limited, the number of files you can store in a sub-directory isn't, and you can store as many files as you like in one. But be warned: you may notice a performance slowdown in MS-DOS when creating many files in a sub-directory. MS-DOS is much slower at accessing a sub-directory that contains many files or deleted files than at accessing a brand-new sub-directory — that is, one that contains no deleted files.



# hands on

## 16-bit

This slowdown occurs because MS-DOS directories do not get smaller when you delete a file. MS-DOS simply pads out the directory by inserting a “no file here” mark for each deleted file in a directory.

**There are two different** “no file here” marks in the first bytes of directories: 00h and E5h. Whenever you create a file, MS-DOS searches to the end of the directory to see if a file with that name already exists. Even if files have been deleted from the directory, MS-DOS must still check for the “no file here” entry for each deleted file. If you copied 100 files to a sub-directory, it would take DOS exactly as long for it to scan for the presence of a file as it would if you had deleted them all! The moral of the tale is that it’s often better to copy files from a heavily used sub-directory, delete it, re-create it and copy them all back.

**4 Shelling out.** This is a tip that will benefit any DOS program that makes use of a TEMP directory, in particular that old clunker, the DOS Shell. While DOS Shell was dropped from MS-DOS 6.2, there are still a few MS-DOS 5.0 and 6.0 users who persevere with it. One of its more attractive features is task-swapping — a kind of poor man’s multitasking — that allows you to load several programs into memory and lets you switch between them, with only the current app being active. The background tasks are in fact dumped to disk to save memory and this is a slow process, but it can be speeded up by swapping to a RAM Drive instead. To do this, add a line like this to your CONFIG.SYS:

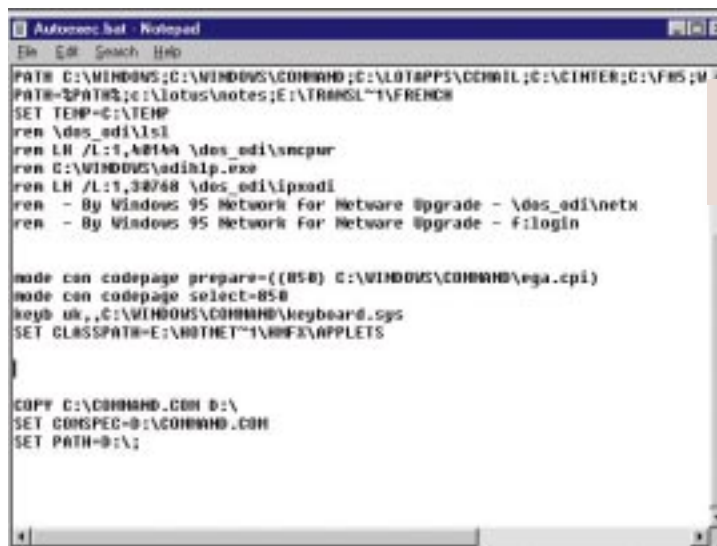
```
DEVICE=C:\DOS\RAMDRIVE.SYS-  
512 /E
```

Then add this line to your AUTOEXEC.BAT file:

```
SET TEMP=D:\
```

(or the drive letter of your RAM Drive). DOS Shell will see that the temp drive has changed and will write to the much faster RAM Drive instead.

**5 Illegal entry.** Sometimes, thanks to some glitch, you’ll wind up with a directory name that contains one of MS-DOS’s illegal characters, typically a space. The MS-DOS RD command cannot be used to delete a directory with, say, a blank space in the name, because it doesn’t expect to come across illegal



◀ **ADDING A RAM DRIVE TO THE AUTOEXEC.BAT FILE**

characters. However, you can use the MS-DOS programs DELTREE and MOVE to either delete or rename these directories.

**Say you wanted to eliminate** a directory with the illegal name DIREC RY. Simply enter `DELTREE DIREC RY <CR>` and the sub-directory “DIREC RY” in the above example, complete with an illegal space, will be deleted. You can also use MOVE to much the same effect: `MOVE DIREC RY DIRECTRY` This command effectively renames the sub-directory to a more DOS-legal DIRECTRY. Handy, eh?

**6 Make room.** One of the more attractive uses of DoubleSpace is to increase the size of RAM disks. But to do this you would normally have to go through the palaver of compressing the RAM Drive each time you turn your PC on. You can automate this process by temporarily storing a previously compressed RAM Drive compressed volume file (CVF) on your hard-disk drive, and then placing two commands in your AUTOEXEC.BAT to copy and mount the CVF on the RAM Drive when you start your computer.

**First create a RAM disk** in the usual way, thus:

```
DEVICE=C:\DOS\RAMDRIVE.-  
SYS 1280 /E
```

Don’t be tempted to change the default sector size of the RAM disk from 512 bytes — DoubleSpace won’t like it.

Now compress the RAM Drive, using this command

```
DBLSPACE /COMPRESS D:
```

Next, resize the compressed drive to its maximum size (and thereby reduce the size of the host drive to zero bytes):

```
DBLSPACE /SIZE /RESERVE=0 D:
```

Then change the CVF attributes so the file can be copied. For example:

```
ATTRIB H:\DBLSPACE.-  
000 -S -H -R
```

where H: is the host drive for the RAM disk. Now copy the CVF to an uncompressed hard disk, renaming it on the way to avoid confusing DoubleSpace, for example:

```
COPY H:\DBLSPACE.000 C:\DOS-  
\RAMCVF.000
```

Finally, add the following lines to your AUTOEXEC.BAT so that the CVF is copied back to your RAM Drive and mounted each time you start up your computer.

```
COPY C:\DOS\RAMCVF.000-  
D:\DBLSPACE.000  
DBLSPACE /MOUNT=000 D:-  
/NEWDRIVE=H:
```

Check that it has worked by entering `DBLSPACE /LIST <CR>`

**That’s all for now.** But remember, if you have shed new light on the “dark half” I call DOS, then do drop me a line.

### PCW CONTACTS

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# On the SUBST bench

For home games — or, **setting up user directories** — SUBST scores. Andrew Ward commentates.

**R**evisiting the issue of how to set up home directories for different users effectively, a number of people, including Jolyon Shotton, have written in to point out that the SUBST command still works in Windows NT. Those of you who weren't brought up with DOS will probably not have the faintest idea what I'm on about, so for your benefit, here's a brief description.

To all intents and purposes, what SUBST does is to map drives but from the command line — the same as the "map drive" button in the Explorer toolbar. That reminds me: I don't think the Map Drive and Disconnect buttons are turned on as standard in the Explorer toolbar. You can of course achieve the same thing from drop-down menus in the left-hand Explorer pane, but if you do want to use the buttons, this is how you turn them on.

Select View / Folder Options from the menu and go for the View tab. Under Advanced Settings, Files And Folders, tick the item called Show Map Network Drive Button In Toolbar.

Back to SUBST. The syntax is SUBST d: pathname, where d: is the drive letter

you want to map and pathname is the directory path you're interested in. But what's particularly interesting is that %username% works with SUBST, so all users can execute the same SUBST command on start-up, yet end up with their own directories mapped. For example, if you wish to map user directories to drive X:, a suitable SUBST command might be [read as one line]:

```
subst x:\\VEGAS\users\%username%
```

One option would then be to place this command in a .cmd file in the All Users start-up profile at:

```
%systemroot%\Profiles\AllUsers\Start Menu\Programs\Startup
```

### Route planning

When I used to use dial-up networking, I often found that the routing went awry. In theory, by using the route command, it ought to be possible to manually fix the routing table. In reality, it's just not worth the trouble. If you delete the entire table using this command:

```
route delete *
```

then the important bits are rebuilt automatically. Don't try this if you don't

use dial-up networking, as you are likely to find that routes you really need, no longer work — until you next reboot.

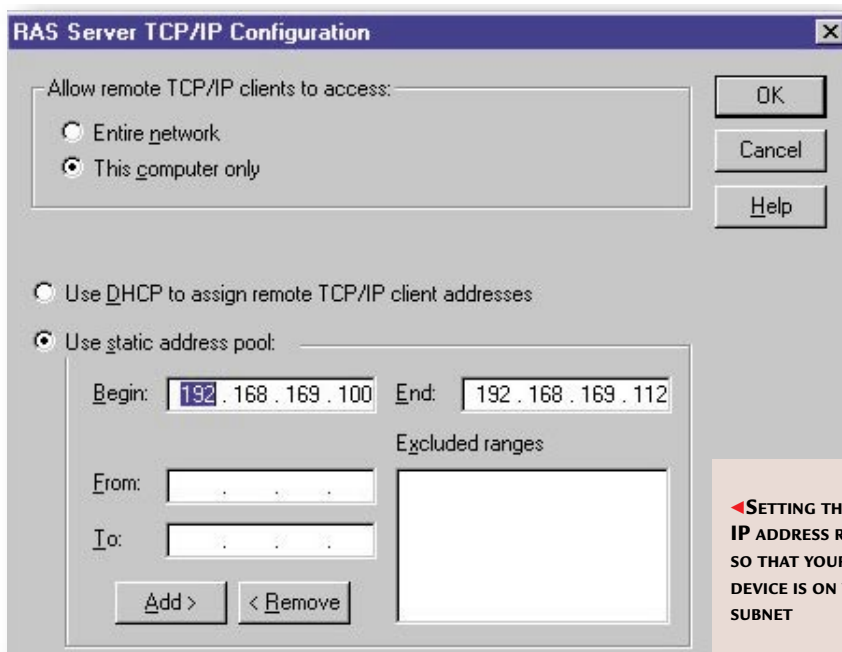
**Here's some more** information on why the Windows CE Services cause additional routing problems. Specifically, they generate off-subnet IP traffic which may cause your internet connection device (LAN modem, ISDN router, or whatever) to bring up your connection unnecessarily.

Firstly, installing the Windows CE Services causes RAS to be re-installed. Whenever RAS is installed, it enables the Remote Access Autodial Manager service, which in turn causes off-network traffic to be generated each time a user logs on. So, the first thing to do is go to the Services Control Panel and set the Remote Access Autodial Manager to be disabled.

## You are likely to find that routes you really need, no longer work

The next problem is that whenever your Windows CE device is turned off or disconnected from the PC, off-network traffic is once again generated. This is because the Windows CE Services use IP to talk to the Windows CE device, and they've chosen the address 192.168.55.100 as the default for the handheld device. Hence, whenever the services look to see if the device is there, off-network traffic is generated (assuming that 192.168.55 isn't your subnet). Unhelpfully, the advice given by Microsoft in the accompanying help files is simply to turn off RAS autodial (it is not suggested what you should do if you have a LAN modem or ISDN router).

Of course, a far more sensible suggestion is to change the IP address of the handheld device so it's actually on your own subnet. In my case, this meant moving it to 192.168.169.100. First of all, within Windows NT, go to the Network Control Panel, select the Services tab and highlight Remote Access Service. Click on Properties. Eventually you'll see a



◀ **SETTING THE RAS IP ADDRESS RANGE SO THAT YOUR CE DEVICE IS ON YOUR SUBNET**



list of ports and devices: highlight the entry for Dial-Up Networking Serial Cable and hit Network... Then select Configure... (for TCP/IP), choose Use Static Address Pool and change the range to 192.168.169.100-192.168.169.112. Then click OK, OK, Continue and Close.

No changes to the palm-sized PC device are necessary, since it should be set to use a server-assigned IP address already.

■ **Making a splash**

I like the easy ones. Eric Adler asks whether it is possible to change the splash screen you get on start-up with Windows NT. Actually, this is very easy, since it's simply stored in a BMP file. My memory suggested this would be called LANMAN.BMP, but something must have been updated at some time because the new name is WINNT.BMP, or WINNT256.BMP for displays capable of 256 colours or greater. You'll find these files at:

```
%systemroot%\winnt.bmp
%systemroot%\winnt256.bmp
```

You can, I believe, delete or rename these files to prevent them being shown at all. But if you want your own image displayed, then just rename your file (it must be in BMP format and in the %systemroot% directory) as winnt256.bmp or winnt.bmp as appropriate (depending on the number of colours in the file and the display). If you want to do this properly, you'll have to make two image files or keep the number of colours to 16 or below.

## POP GOES THE NTMAIL

For those of you who want a mail server but don't really fancy biting the Exchange Server bullet, NTMail version 4 is well worthy of consideration. It provides SMTP, POP3, IMAP4rev1, Finger, PASSWD and HTTP Proxy Internet services. Mailboxes themselves

may be accessed via POP3, IMAP4 and even a web browser. I must confess that I don't like NTMail quite so much as MDAemon, which is particularly good at fetching mail from external POP3 sources and automatically working out which internal

mailboxes to redistribute it to, but there's nothing wrong with it. I have found that the web-based system administration is particularly useful, saving the need to physically access the server on which it is installed, to perform administrative tasks.

■ **Service Pack 4 at last**

Service Pack 4 was released at long last just a couple of days before I wrote this column. Early indications are good, with "rock solid" being the typical comment from users. There are a few glitches however, most notably that Windows NT tries to run TIPS.EXE, part of the Microsoft IntelliPoint mouse software, which causes a GPF. To stop this happening, just delete the registry entry that runs TIPS.EXE.

As predicted, SP4 is available in two versions: either the full download or a web-based patch install. The latter course is by far the most preferable for home users who only have one system to patch and aren't likely to change their configuration often.

Remember that if you ever make any change to the system that involves copying files from the original NT install disk, you must reapply the service pack; so if you make frequent changes, then downloading the full 31Mb (42Mb Alpha) is the best way for you. Otherwise, you'd have to go online to re-patch your system every time.

Microsoft terms these two install modes the Traditional and Optimised modes respectively. For the Optimised mode to work, you probably need Internet Explorer 3.02 or later, so if you use Netscape Navigator or Communicator, download the Traditional installation and run it in the usual way.

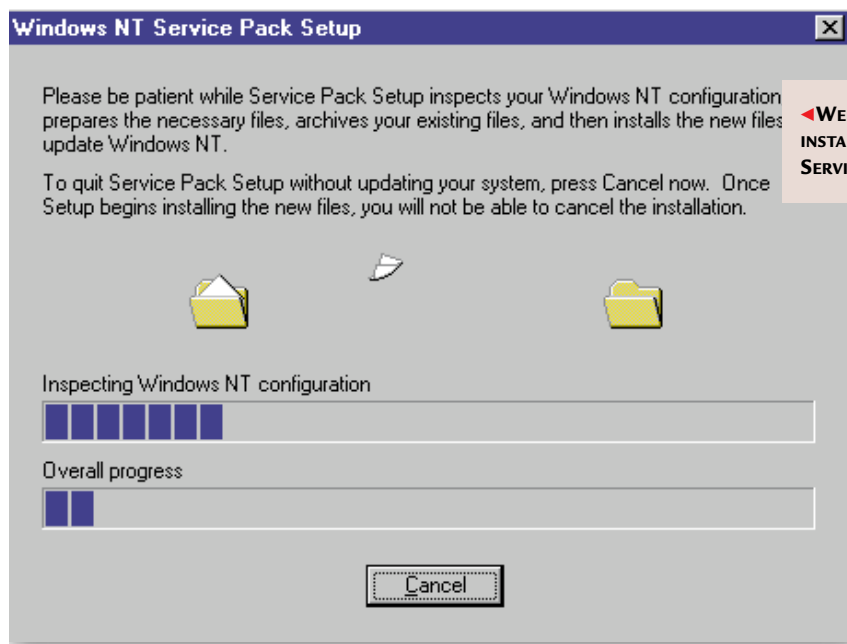
You can find both Service Pack 4 versions at the following location: [www.eu.microsoft.com/windows/downloads/contents/Updates/NT4SvcPk4](http://www.eu.microsoft.com/windows/downloads/contents/Updates/NT4SvcPk4).

◀ **WEB**  
**INSTALLATION FOR**  
**SERVICE PACK 4**

Note that it is the same service pack whether you have Windows NT Workstation 4.0, Windows NT Server 4.0 or Windows NT Server 4.0 (Enterprise Edition) installed. Fixes to the Windows NT 4.0 Option pack are also included, but remember that there are different service packs for Intel and Alpha processor versions.

## Y2K concerns

Service Pack 4 contains bug fixes, as usual, but there are also changes in two other important areas. Most significantly, all known Year 2000 (Y2K) updates are included, but that's not enough to make your system Y2K





compliant. There are other Microsoft software components you might well have installed, such as the MDAC (Microsoft Data Access Components, or ODBC to you and me) and Internet Explorer 4, which could also have Y2K issues. Therefore, what Microsoft has done is to include a Y2K utility within the service pack which checks the rest of your system for Y2K problems. It doesn't look at separately available application packages like Microsoft Office, just the free add-ons you might consider to be part of the operating system.

### Ringling the changes

The other important set of changes is enhanced functionality, specifically in these areas:

- Routing Information Protocol (RIP) Listener
- Telephony Application Programming Interface (TAPI) 2.1
- Microsoft File and Print Service for NetWare (FPNW) Support for Client32
- Active Accessibility Support
- DCOM/HTTP Tunnelling
- Visual Studio-MICS
- Remote Procedure Calls (RPC) Enhancements for Visual Basic (VB)
- Remote Winsock (DNS/Port 53)
- IP Helper API (IPHLAPI)
- InternetGroup Management Protocol (IGMP) version 2
- Euro Key Patch
- CryptoAPI and Authenticode
- Profile Quotas (Proquota.exe)
- Microsoft Routing and Remote Access Service (RRAS)

### START AND STOP

**T**hanks to Mark Lambourne for pointing out the drawbacks of my suggested method of shutting down services from the command prompt using NET STOP. Mark says the NET STOP command doesn't wait as long for services to stop as the Services Control Panel does, with the result that

it will time out with an error like "The selected service could not be stopped". This leaves the service somewhere between running and not running, with the result that the Services Control Panel would report the service as Stopped, but any attempt to click the Start button produces another error: "The

selected service has already been started". Attempting to sort this out by restarting or shutting down the system then results in a shutdown procedure which takes even longer than normal, thus defeating the entire object. Mark has observed that proxy server services appear to be the worst offenders.

- PPTP Performance and Security Update
- CHKDSK Enhancements (new /C and /I switches)
- New functionality with NBTSTAT.EXE (new /RR switch to renew WINS client registrations)

**That's what you get** if you download the service pack or patch your system over the web. But for those who get their hands on the CD, there's a whole lot more in store:

- Compaq Fibre Storage Driver
- Web-Based Enterprise Management (WBEM)
- Message Queue (MSMQ) for Windows 95 Client
- Security Configuration Manager (SCM)
- Windows NT Server NetShow Services
- Windows Media Player

- Windows NT 4.0 Resource Kit Support Tools
- Site Server Express 3.0 (Upgrade Only)
- Microsoft Internet Explorer 4.01 Service Pack 1
- Microsoft Data Access Components 2.0 Service Pack 1
- Windows NT 4.0 Resource Kit Support Tools
- Year 2000

However, before you embark on a Service Pack 4 installation, your best bet is to run the Year 2000 Service Pack 4 utility. If this finds problems with other components, you may well be better off downloading the full Year 2000 Service Pack 4. This is over 70Mb, but as well as the standard service pack it will detect and upgrade Internet Explorer 4.01 SP1, Microsoft Data Access Components (MDAC) 2.0 Service Pack 1, and/or Site Server Express 3.0 (if earlier versions exist on the system) to fix Y2K problems.

**If you just install** the standard service pack, don't worry. When your system restarts, you are automatically told whether or not there are other components which need Y2K upgrades. In theory it's possible to do this then and there, although I haven't seen it work yet. Note that there is no uninstall option for Y2K corrections.

### DIRECTORY COMPLETION

**I**wrote a while ago about how you can turn on command completion, so that if you type-in just the first letter or two of a directory or filename, then pressing the TAB key can complete the whole name for you. Umer Nalla writes to point out that if you

type CD followed by a space and then hit TAB, the command window will automatically cycle through the directory names for you. Append a backslash (\) and repeat the process to traverse further levels. But what Umer points out that I didn't know, is that you can drag a

directory or a file from NT Explorer into a Command Prompt window to save typing in the path and filename. Just remember to type a double-quote symbol first if the pathname is going to contain spaces, otherwise it won't work. Thanks for that one!

### PCW CONTACTS

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# No strings attached

Mark Whitehorn looks at **stringless connections** and unravels knotty PDA connectivity problems.

It was my intention, this month, to go into the nitty-gritty of connecting PDAs to the internet. However, I have been deluged by a whole series of communications which discuss alternatives to the “traditional” PDA-modem-phone socket-ISP way of doing things. It seemed worth airing these for the sake of those who are still undecided.

For example, “gorgeous” Steve Goddard <[gorgeous@globalnet.co.uk](mailto:gorgeous@globalnet.co.uk)> wonders whether the wet string approach is outmoded. “I have just purchased a Psion Series 5 and own a mobile telephone, so I made some enquiries on how to use them together. It would appear that a good option is to replace my mobile with an Ericsson SH888, which has a built-in modem and IrDA port. Ericsson has supplied the correct settings to configure it all properly (on two Word docs). Are there any potential problems I have missed in buying the phone, as it all appears too good to be true. I am wondering why everyone else isn't doing the same or at least telling us all what a good idea it would be!”

As an aside, you have to admire anyone who uses a name like [gorgeous@globalnet](mailto:gorgeous@globalnet)! For many years I was [Penguin@CIX](mailto:Penguin@CIX) and that used to get me into enough trouble. Take my advice: never, ever, post anything to the newsgroup [alt.penguin-fetish](mailto:alt.penguin-fetish). [recovery](http://recovery) (yes, it really exists) when your

***‘I wrote and sent this message from a Nokia in the back of a taxi in Paris’***

name is Penguin. There are some *very* strange people on the internet.

**The answer is** that I have no idea why using a Psion and an SH888 should be a bad idea. It sounds wonderful to me. Has anyone out there tried it? If so, tell us how it went. I contacted Ericsson and was told that not only will the SH888 do all of these

wonderful things, but so will the 600, 700 or 800 series phones. So, if you already have one of those, read on.

All you need is the DI27 data accessory, an infra-red modem compatible with most PDAs (not just Psions). It is tiny, weighs less than 10g and measures 23 x 46 x 14mm — let's say about the size of a matchbox and about the same weight as a

cute little Nokia 9000 out of his pocket. But the 9000 is a mobile phone and, as such, is neither cute nor little — the term “brick-like” springs to mind — yet if you compare its size and weight to those of a PDA... well, OK, so it's still a little lumpy. But consider how carrying a PDA and a mobile phone will badly mess up your Armani suit; suddenly, the Nokia seems quite svelte because it is



both a phone and a PDA. It makes sense. Most of us will use a PC at the office or at home for internet stuff. It is only when we're on the move that we want to use a PDA for web browsing and email.

**▲ THE NOKIA 9000 FITS YOUR ARMANI SUIT A TREAT**

**Combining the PDA and phone** is definitely a masterstroke. I borrowed one from

cigarette lighter. Utilising the IrDA protocol enables you to exchange data with the Psion 5, any PC featuring an IrDA port and Windows CE 2.0 PDAs, and the Palm 3.

Steve also wonders how he can get SMS (short message services) to work on the Psion 5, since the Psion message suite doesn't support SMS (Vodafone in his case) handling. I would welcome comments from readers.

**■ Nokia masterstroke**

The whole idea of PDAs, mobile phones and stringless connections so intrigues me that I was tempted to ask Ericsson for the loan of an SH888 to try it out. However, Big Bad Bob Walder (he of the *Hands On Networks* column) diverted me from this noble endeavour. In fact, it's Bob's fault that I'm in love — again. Yes, I know it was the same story last month, but this time it's different; this is the real thing.

Bob and I were talking about using PDAs on the internet and he pulled this

Nokia and I am genuinely impressed with the way in which the combination works. The Nokia has, in PDA mode, a perfectly respectable contacts/address book and calendar/appointment system. True, the interface is a little kludgy, but the integration with the phone is excellent. For instance, you can look up a contact and automatically call them at the press of a button. Astoundingly though, the Nokia has a built-in web browser. No cables, no configuring of external modems, no drivers — it's just there. All you need is an ISP account.

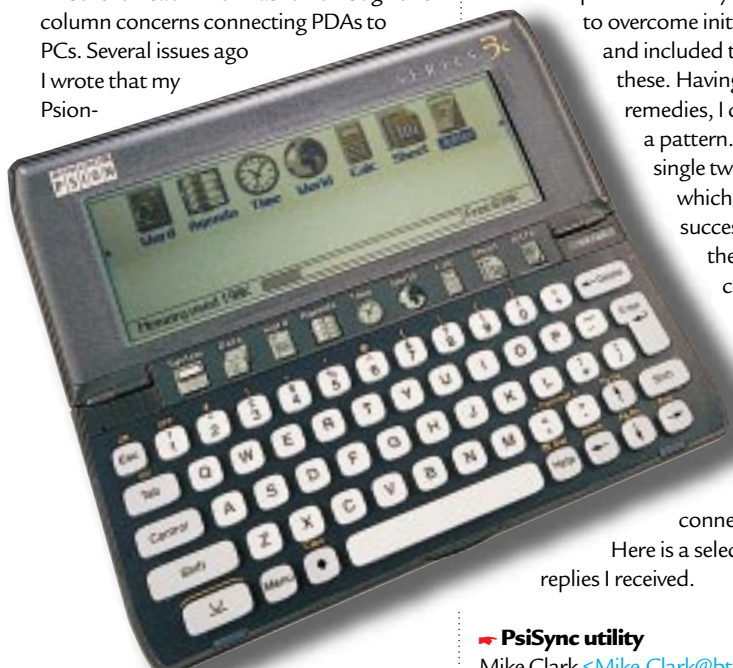
After a while, I got to love the Nokia, so parting at the end of the month will be a Romeo and Juliet affair. The only major problem (or so I thought) was that the keyboard is unsuitable for extended writing:

for a professional writer, this is a bit of a stumbling block. Then, in one of those odd twists which I am rapidly coming to accept as normal for this column, the following (abridged) message arrived in my email box, from John Edwards <[john@jzedward.demon.co.uk](mailto:john@jzedward.demon.co.uk)>: "In your November '98 column you asked for comments on PDA sync apps following comments from a couple of Psion users. I recently upgraded from a Psion 3a to a Nokia 9000 and spent some time getting data into sync with Schedule+ and, later, Outlook 98. Below are my comments on the 'upgrade' to the Nokia. I hope you find the comments interesting."

Well, I did find it interesting, not least because the whole of John's email is 741 words long and ends with: "P.S. I wrote and sent this message from a Nokia in the back of a taxi in Paris." Unfortunately, his message, which is packed with interesting comments, is actually too long to include as part of this column but I have included it as a text file on our cover-mounted CD-ROM. What can I say? The Nokia keyboard is clearly perfectly usable, it just takes practice. And by the time you read this, the new, slimline version will be out.

#### ■ Waving, not connecting

Another thread which has run through this column concerns connecting PDAs to PCs. Several issues ago I wrote that my Psion-



▲ **PsiWin 2.2 PROVIDES EXTENDED FUNCTIONALITY FOR SERIES 3 USERS**



▲ **FIG 1 THIS IS HOW THE PROBLEM APPEARS ON SCREEN. AND THEY WAVE, AND WAVE...**

to-PC connection was flaky. Sometimes it worked, and sometimes I was left looking at a pair of waving wires [Fig 1]. I asked for email votes, with headers "Me too" if you had the same problem, or "Well, it works for me" if you didn't. The results were that 58 percent of respondents reported significant problems.

Clearly this survey is biased because people are more likely to respond if they are angry. So, I strongly suspect the truth is that the majority of

people are happy with PsiWin.

However, I still consider this to be reasonable evidence that I am not alone with my troubles, and I have passed the figures on to Psion. Several readers

reported that they had managed to overcome initial problems and included their cures for these. Having examined the remedies, I cannot really see a pattern. There is no single tweak or setting which will guarantee success. However,

the other side of the coin is that somewhere, buried deep in these emails, may be the cure for your connectivity problem.

Here is a selection of the replies I received.

#### ➔ **PsiSync utility**

Mike Clark <[Mike.Clark@btinternet.com](mailto:Mike.Clark@btinternet.com)> says: "I can highly recommend a shareware utility called PsiSync which is available for download from [www.kerswell.demon.co.uk](http://www.kerswell.demon.co.uk). I have been using this for several months and find that it works perfectly. There is an impressive Hot-Sync facility: whenever you

connect your Psion to the PC and switch it on, PsiSync detects it and automatically synchronises the calendar/agenda and tasks. You can limit this to once per day if you want. You can even choose a French interface in addition to several other languages."

#### ➔ **PsiWin 2.1 to PC**

Joost Aerssens <[j.aerssens@columbi.nl](mailto:j.aerssens@columbi.nl)> comments: "For two weeks now I have

been using a new PC, a Dell Latitude Cpi D266XT, equipped with an infra-red port which, of course, I would like to use

instead of having to carry a cable everywhere I go.

"Correctly installing all my PCMCIA cards is a problem, at least if I want to work them flawlessly with my infra-red port installed. Interrupt and comms-port problems occur. As a consequence I had to do a lot of tuning and configuring on my PC and I encountered a very strange thing. Once PsiWin 2.1 was configured (this is done during installation) for a certain setup of comm ports, I could not make any changes in the ports' configuration without having to deinstall and reinstall PsiWin 2.1. This is because the complete comm-port setup in PsiWin is lost and it does not automatically re-detect the comm ports.

"So, in the case that your comm port setup has changed, PsiWin does not recognise any comm port and thus cannot establish a data connection. And, you cannot stop the software trying to connect, in order to make the changes in the PsiWin setting! This is an annoying shortcoming in the software."

Joost's email is too long to print in its entirety, but if you want to use an IR link it is too useful to leave out, so I have put it on this month's cover-mounted CD-ROM.

#### ➔ **Psion 5 to Outlook 98**

Iris Crivon <[ic@simonette.demon.co.uk](mailto:ic@simonette.demon.co.uk)> writes: "I have never been able to

*There is no single tweak or setting which will guarantee success*



# hands on

## PDA's

successfully synchronise the Psion 5 with Microsoft Outlook 98. The conversion engine often crashes completely.

"When it does work, I find that it writes back to the 5 so that I have multiple entries of everything. It will take ages to clear out my database. The only way I have found to have entries in Outlook 98 is to synchronise with Lotus Organiser 97 and import the agenda and database entries into Outlook 98.

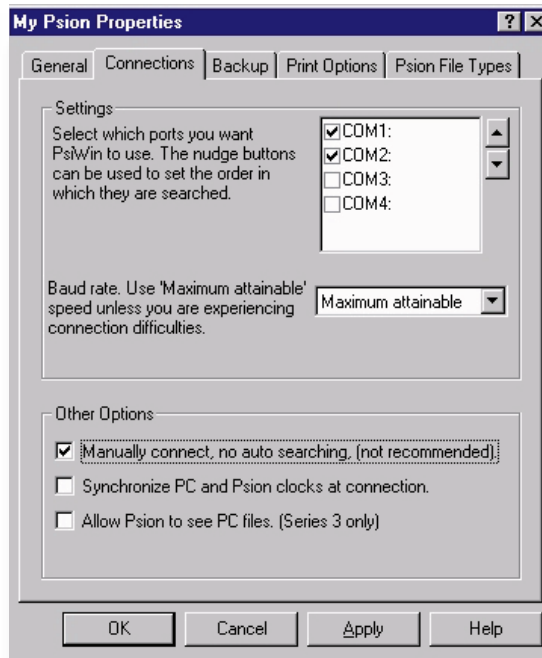
"Psion now bundles PsiWin 2.2 with new Psions. This may resolve some of the problems but I understand that it is not going to be available for a free download. For some time now on its web site, the company has been promising a service pack for PsiWin 2.1 but as yet there is no sign of it. I have had Psions since version 3 and have always found the PC software to be flaky. The 3, 3A and the 5 are great products and are very stable. But connectivity, well...!"

### ➔ Psion 5 via PsiWin 2.1

Andrew Bovett <a\_bovett@csi.com> has some advice: "In the November *Hands On PDAs* column you mentioned problems getting PsiWin to connect. I have a Psion Series 5 and in the past I have had problems getting it to connect via PsiWin 2.1. However, I have found a method which

always works for me. I have the 'Manually connect' option selected [Fig 2], as the automatic detection fouled up my modem connection (I have to share a port between modem and Psion as I'm short of serial ports). I discovered that if I tried to connect by using the 'My Psion' icon on the desktop, more often than not, it failed to work. But by using the PsiWin icon in the system tray to connect, it works every time. The procedure I follow is:

- 1 Make sure** that the remote link on the Psion is set to 'Cable' — it sometimes seems to get turned off, so it's worth checking first.
- 2 Right-click** on the PsiWin icon in the system tray (a straight horizontal line) and select 'Connect'. If this is successful, the icon will turn to a wavy line, indicating a successful connection. If not, check cables, serial ports, baud rates, etc.



▲ **FIG 2** ANDREW RECOMMENDS TURNING OFF THE AUTOSEARCH, EVEN THOUGH THIS IS NOT RECOMMENDED BY PSION

**3 You can now open** the 'My Psion' icon on the desktop, or simply do a backup by right-clicking the 'My Psion' icon and selecting the 'Backup' option."

### ➔ FIFO disabled

David Oram <david@orams-place.freereserve.co.uk> writes: "I too have had problems getting my Psion 5 and 3a to connect to my PC using all versions of PsiWin, up to and including v2.1, under Windows 95.

I have found that if I disable the FIFO buffer in my serial-port properties, then I can connect without any problems. I don't know why, but it seems to work!"



▲ **FIVE ALIVE:** IT IS POSSIBLE TO CONNECT THE SERIES 5 TO A PC

## WHAT PRICE VERSION 2.2?

The concern that Iris Crivon expresses in her email (see "*Psion 5 to Outlook 98*", p261), namely that Psion will charge for version 2.2, is covered by this email that reader Steve Goddard forwarded to me, having previously received a reply from Psion's UK support team.

"Thanks for your reply," wrote Steve. "Am I to understand that having recently purchased a Series 5 (after the release of PsiWin 2.2) which came with PsiWin 2.0, I am expected to pay for an upgrade to the version you are supposed to be currently shipping with the Series 5? I understand that v2.2 is a commercial money-making project, given the extended functionality it has for existing Series 3 users. However, I do not understand why a download is not available to Series 5 buyers unfortunate enough to get older stock (bearing in mind that it is perfectly feasible to password-protect such web downloads, daily if necessary) by advising passwords to registered Series 5 buyers. This would not affect your revenues from Series 3 owners who are upgrading."

"From: UK Support <uk-support@psion.com>. PsiWin 2.2 is not available as a download as it is a chargeable product. In about ten days' time you'll be able to buy it from Dixons, Comet etc. as software only. At the moment you can only get it with a cable (which costs £20 more) for £50 [the software-only cost is about £30 — MW]. You can buy this version from Widget Software on 01438 818818."

I have to side with Steve on this one because I see version 2.2 as more of a bug fix than a significant upgrade. But then, I'm biased, because PsiWin gives me so much trouble in the first place that I see all new versions as potential bug-fixers.

## PCW CONTACTS

Mark Whitehorn welcomes readers' correspondence and ideas for the *Hands On PDAs* column. Contact him via the PCW editorial office (address, p10) or email [pda@pcw.co.uk](mailto:pda@pcw.co.uk).



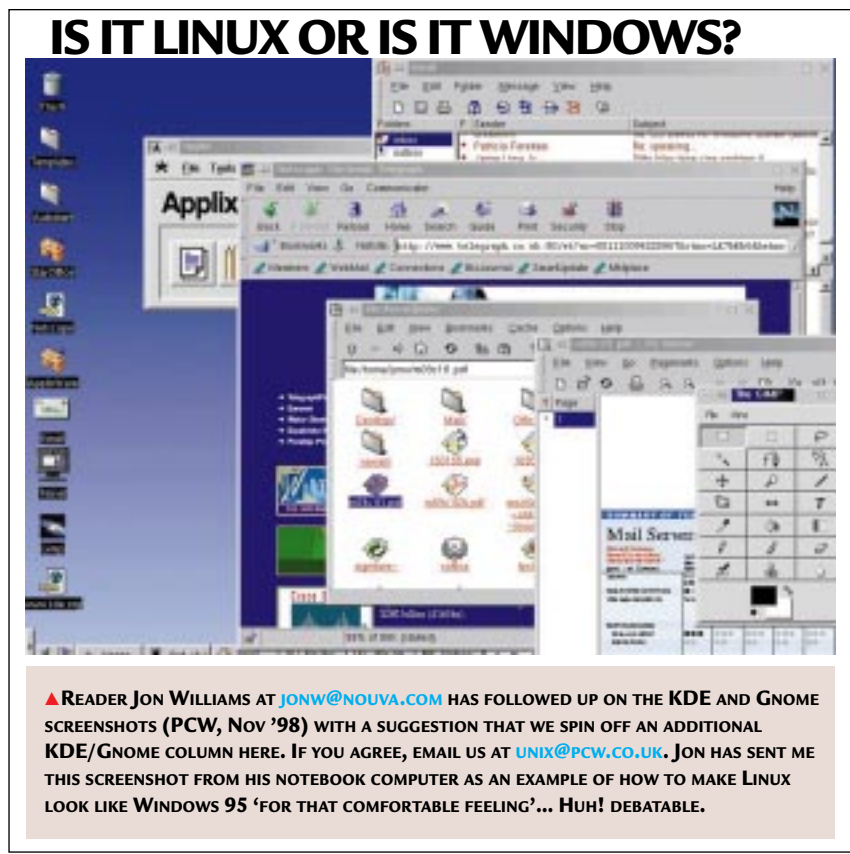
# Roots and boots

**Chris Bidmead has a fix for those flummoxed by the tomsrtbt floppy.**

I've had quite a bit of feedback on tomsrtbt, the Linux-on-a-floppy to which I introduced you a couple of issues ago (the home page has since moved to [www.toms.net/rb](http://www.toms.net/rb)). From your emails I see that many of you have had a problem creating the floppy. I told the first readers who emailed me with this complaint that their floppy drives might be too old and probably weren't capable of handling the 1,722Kb formatting that tomsrtbt requires. Sorry — this was probably rubbish.

What I hadn't realised was that many of you have been trying to create the disk from a Windows 95/98 DOS emulation screen. This won't work: the emulator doesn't connect to the diskette at a sufficiently low hardware level for the superformat utility to work. If you're a Windows user you'll need to reboot the machine into a real DOS session. But if you still can't cut it, there's an alternative small Linux that boots from a pair of 1,440Mb diskettes which you can download from [www.trinux.org/](http://www.trinux.org/). Alternatively, there's a single-floppy Linux implementation at <http://206.47.27.32/~ebenoit/loaf/>.

**I'm getting to like** tomsrtbt a lot. No, it doesn't give you a delicious GUI, but then, delicious GUIs can be pernicious to the extent that they hide away details about which you really ought to know. Boot up the tomsrtbt diskette and you find yourself at the command line with a limited subset of Unix tools with which to work. It's back to basics, but there's a lot you can do



and learn with it. For example, if you've ever installed a Linux distribution — or a version of Windows, come to that — on a networked machine, you'll remember how the installation walks you through the process of setting up the network connection, asking you about network cards, dotted quad addresses, nameservers and suchlike. What exactly does it do with all this info? And later, when the net connection mysteriously falls over, what do you do?

Helpful GUI dialogue boxes often dangerously conceal the specifics of what's going on under the surface. They don't show you what you'll need to fix when things go wrong — and often it's

not at all complicated, if you know what you're doing, which you don't because the GUI has blindfolded you.

**Here's how I set up** a network connection on my ten-year-old Nokia AlfaSkop 386 machine, using tomsrtbt. Insert floppy and boot. Have a cup of coffee — with the 16MHz 386, this part takes forever. However, once tomsrtbt is installed, it's the fastest way of running UN\*X on the hardware because everything is carried out from RAM disks. As a corollary, another benefit is that whatever you already have installed on the machine doesn't get touched and cannot be harmed.

OK, Linux version 2.0.35 is now up and running. There is no network connection. I can see this by typing ifconfig at the prompt — it just gives me something like that shown in Fig 1. This means the

**[FIG 1]** The missing link

```

lo    Link encap:Local Loopback
      inet addr:127.0.0.1  Bcast:127.255.255.255  Mask:255.0.0.0
      UP BROADCAST LOOPBACK RUNNING MTU:3584  Metric:1
      RX packets:1 errors:0 dropped:0 overruns:0
      TX packets:1 errors:0 dropped:0 overruns:0

```



loopback connection internal to this machine is established, but there's no link to the outside world. I can fix this with

```
ifconfig eth0 192.168.1.1
```

or, in plain English, "Configure the interface called eth0 as 192.168.1.1".

Damn! I get an error message: "Unknown interface". I have tried to give eth0, the ethernet device, a dotted quad address but there's no such thing. Well, there is *physically*; it's a very old 8-bit NE1000 but the software doesn't know about it.

With the latest versions of Linux, this NIC is driven by a dynamically loadable module, ne.o. Normally I would run lsmod, the list modules utility, to see if this module is loaded, but tomsrtbt misses out lsmod to economise on space. But you don't really need it. Linux uses a directory called /proc, a kind of fake filesystem where you can peer into the heart of your Linux installation by looking in the appropriate files or subdirectories. In this case, /proc/modules tells the story — there's no ne.o loaded.

**OK, so I insert the module** with insmod ne. There are no messages in response to this, so it looks as if this has succeeded (Unix conventionally respects terseness and only speaks up when things go awry). Inspecting /proc/modules confirms that ne.o is now running. Now I can repeat the ifconfig exercise above — successfully this time.

I still can't ping anywhere yet (except through my own loopback) because I haven't yet set up a route between my now working eth0 and the network itself. The command which does this is called, reasonably enough, "route". It works like this:

```
route add -net 192.168.1.0 - eth0
```

which means "add eth0 to the existing network whose name is 192.168.1.0". The 0 at the end means the whole network.

Another TCP/IP convention is that 255 at the end means "every device on the network". Pinging 192.168.1.255 is a useful way of seeing what's running. The result is a working network connection.

This is relatively easy for me because I've done it before, but even if you're a complete beginner you should not be at a loss with tomsrtbt because, despite its compact size, there are manual pages for most of the utilities it provides, including

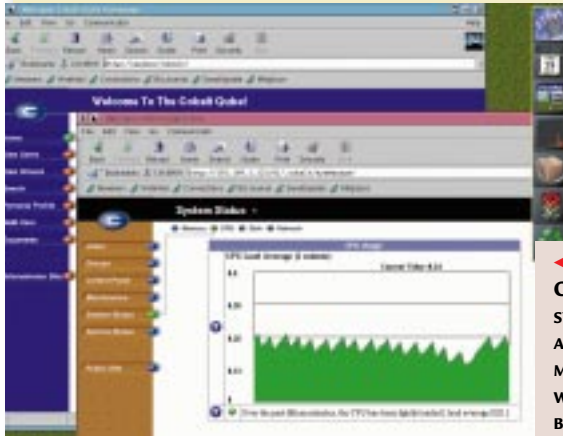
## THE COBALT CUBE

Last month, separately from this column, I reviewed the Cobalt Qube 2700, a neat hardware add-on which brings web serving and free text retrieval to any network. It happens to run Linux, so it's easy to hack it to do a lot of other things. John Adams at the UK supplier, Mintra (phone 0161 256 4030), is very kindly allowing me to experiment with it for a while. Initially, I plugged it into my own network here as yet another regular Linux machine,



with the interesting twist that it's based on a Mips processor rather than an Intel chip. I may yet get around to that,

but it's turned out that the bundled software — a web server, a document organiser and some web-based system management tools — really do turn this attractive little blue box into a compelling, self-sufficient "Intranet Device". So far, I've found a lot of work for it in that mode. Check out the screenshot [Fig 2].



**FIG 2** HERE'S PART OF THE COBALT QUBE WEB-BASED SYSTEM MANAGEMENT. AN AUTHORISED SYSADMIN CAN MANAGE THE QUBE FROM ANY WORKSTATION WITH A WEB BROWSER

ifconfig and route. "But a complete beginner will not even know to look for the manual pages of ifconfig," I hear you cry. Well, you're right. But I am visualising a proactive beginner who is inquisitive enough to have stumbled on the documentation in /usr/doc — the standard Linux place to keep documentation — and has followed the trail from there. Tomsrtbt is not much use for the uninquisitive, but then, I didn't say it was.

You will be able to find an alternative approach to Linux-on-a-high-density-floppy, called MuLinux, at <http://www4.pisoft.it/~andreoli/mulinux.html>. I have not yet tried it, so if you get there before me, do please let me know what you think of it.

### ■ Intel to the rescue

A word of thanks is due. Five years ago, when I originally set up the multiplatform network around which this column is based, I installed a six-port 10BaseT TigerHub from SMC to connect my newer 10BaseT networked machines to my legacy 10Base2 "Cheapernet" coaxial network. For half a decade, that hub has been a faithful ally, although running hot enough to fry an egg on.

A good network component is an invisible component, and frankly I've hardly given it a thought since it was first installed. Until last week...

I sat down at my desk in the morning, only to discover that the network was down. The TigerHub had finally burned itself out. I called Steve Roberts, who

handles networking at the UK Intel press office, and he rushed over one of Intel's sleekly designed 10BaseT InBusiness hubs: an eight-port hub this time, which gives me room for some expansion. Hub design seems to have improved in the interim because this one runs cool, so it should be around for a long time. Thanks, Steve.

## Motoring news

I don't drive a car, which perhaps is why I found a recent Microsoft demo of its proposed Windows-CE-in-your-dashboard so hilarious. Codenamed Apollo, the Auto PC is an "in-car multimedia system" which, among other things, reads your emails aloud to you as you drive and no doubt lets you surf the Superhighway by voice control while you're stuck in traffic jams.

Back in the real world, a small UK outfit called Empeg has come up with an eminently practical way of employing computer power behind the wheel. The Empeg [Fig 3] is a dashboard device which delivers CD-quality music you've previously compressed to the MP3 standard on your PC, and then loaded onto the Empeg's internal 2.5in hard drive. The base model comes with a 2.1Gb hard drive that gives you 35 hours of non-stop playing time. Not enough for you? Well, you can fit 16Gb-worth of hard-drive capacity (more in future) into the 6x5x2in unit and drive around with the equivalent of a 300-CD collection which will play non-stop for almost a fortnight!

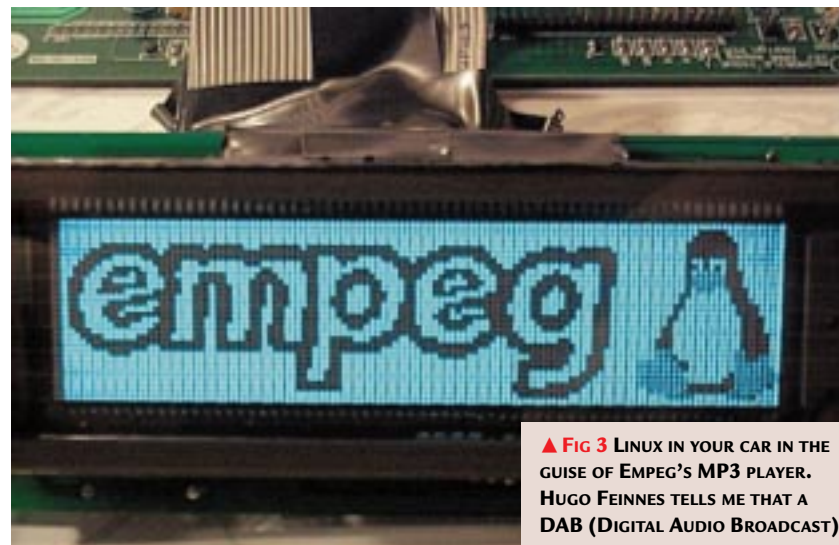
At the time of writing the price had not yet been fixed for the unit, but it's expected to be

about £600 (ex VAT). This includes a

2.1Gb drive and an RDS FM tuner, as well as a docking station, cables (USB and serial), PC software, extra power supply unit, manuals and an installation guide.

**Very nice**, but what's this got to do with Unix? Well, because the thing's really a computer, it needs an operating system. No prizes for guessing which one Empeg is using. The animated penguin on the display should give you a clue. The bad(ish) news is that the software Empeg

**One caveat for Dougie: he needs to stand by for flack...**



▲ Fig 3 LINUX IN YOUR CAR IN THE GUISE OF EMPEG'S MP3 PLAYER. HUGO FEINNES TELLS ME THAT A DAB (DIGITAL AUDIO BROADCAST) ADD-ON IS IN THE WORKS, TOO

provides to compress and download the music only runs under Windows. Empeg plans to make some (non-GUI) Linux software available to do this and the company will be publishing the specification of the transfer format for the unit. Read more about it at [www.empeg.com](http://www.empeg.com).

If you want to save a few bob and build your own machine, Hugo Feinnes, the engineer working on the project, has very generously laid out the full details of his prototype, the mp3mobile, at <http://utter.chaos.org.uk/~altman/mp3mobile/>.

## Beginning again

Dougie Richardson <[dougie@shadow.abel.co.uk](mailto:dougie@shadow.abel.co.uk)> writes to tell me that Linux UK <[www.linuxuk.co.uk](http://www.linuxuk.co.uk)> has started a new section for Linux beginners.

It comes in two parts: a monthly guide to particular topics, like dialup networking, and a beginner's Q&A session. Dougie is inviting readers to contribute questions to the Q&A, as well as ideas about

what they'd like to see in the step-by-step guides. In a sense, I suppose, Dougie's venture is a rival to this column. But in the free-software community, we welcome alternative sources and diversity.

One caveat for Dougie: he needs to stand by for flack. I can tell him from experience that nobody gets to pronounce on Unix in public without receiving a great deal of incoming, er, corrective punishment. For example, his web page as it stands at the time I'm

writing this asserts that Unix filenames cannot contain spaces. It's an easy mistake to make if you don't know that you can always wrap a filename in quotemarks:

**touch "Spaces are just fine"** creates an empty file of that name with no problems on any Unix system I've used. And when Dougie claims "In theory, the filenames you use in Linux can be up to 256 characters, although in practice most of us keep it down to 14", I don't know who he means by "most of us".

**Speaking for myself** (which is about as much as I dare in this column) my filenames will conform to the traditional Unix penchant for terseness where appropriate (why call a Perl test program "testing.prl" when you can call it just "t"?). Alternatively, if I'm about to mess with an XF86Config file, copying the old one to XF86Config.orig is unimaginative. I am just as likely to give the copy an informative name such as "the XF86Config that works alright with my Millennium II but flickers a bit at high resolution". And how about when I backup my PalmPilot to a directory called "PalmPilot dump as of 'date'"?

But Dougie's big advantage is that as the flack flies in, he can fix his web page. My goofs in print, and I've made plenty, stay on the record.

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# Back in business

The unfashionable **OS/2 Warp** title is thriving in the guise of Aurora. Terence Green reports.

**A**s Aurora aka Warp Server 5 went into beta in October, IBM announced that it would be called OS/2 Warp Server for e-business. What a mouthful! IBM says it will be an entry-level e-business server. Good to see the OS/2 Warp name retained. IBM might have retired the OS/2 moniker for image reasons, but the company must have perused the figures for market share in IDC's June 1998 server report. NetWare was at 38 percent, Unix at 21 percent, Windows NT at 16 percent, and OS/2 at 11 percent. Others added up to 14 percent. Nice to see our favourite "dead" operating system right up there with some of the more marketed products.

## Turn on, Plug-in

The new OS/2 Warp version of the Netscape Communicator 4.04 browser is now on the cover CD, along with the OS/2 Plug-in Pack v2.1, thanks to the assistance of Dave Mounce of IBM Hursley. The Netscape file is only a little over 7Mb since it no longer contains a Java runtime. If you want Java support you need to install Java 1.1.4 or a later package such as Java 1.1.6 for OS/2 Warp, which can be found on the cover disc of the October '98 issue of *PCW*.

Netscape Communicator 4.04 is a multi-module suite comprising the Navigator web browser, Messenger email, Collabra news and discussion groups, and Composer HTML editor. Video set to 256 colours or more is essential; you can't use it with 16-colour video.

**The Plug-in Pack** adds some OS/2 audio and video plug-ins and also enables Windows 3.1 plug-ins such as RealPlayer to be used with Communicator 4.04, provided of course that you have Win-OS/2 support installed. If you have problems getting the plug-ins working, try running them as helper applications instead. Helper applications run in a separate session and are easier to set up. The site at <http://budgetweb.com/os2/plugins2.html> is a mine of information

► **NEWSGROUPS AND EMAIL ARE PART OF NETSCAPE COMMUNICATOR 4.04 FOR OS/2 WARP**

▼ **WITH THE OS/2 PLUG-IN PACK YOU CAN RUN STUFF LIKE REALPLAYER 5.0 WITH NETSCAPE FOR OS/2**



Technical Lead on the project, posted some additional information. Here it is. Use Times Roman MT 30 as your font for all encoding in order to view pages from any language. This only works for Chinese and Korean if Fix Pack #5 or later has been installed. You can have the Workplace Shell

on setting up plug-ins in Netscape for OS/2. Netscape Communicator 4.04 is officially supported on Warp 4, WorkSpace on Demand and Warp Server 4. Since Warp Server 4 actually has a Warp 3 base operating system, Fix Pack #32 or later is required. Fix Pack #35 is on the August issue cover CD. Although Communicator is not officially supported on Warp 3 and Warp Connect, it will work if you install Fix Pack #32 or later. Anyone who has to stick to the officially supported packages will need to download the newly refreshed Netscape Navigator 2.02 for OS/2.

launch helpers if you check the application radio button when editing (not creating) a helper, but leave the application entry field blank.

▼ **ON THE PCW COVER DISC: NETSCAPE COMMUNICATOR 4.04 FOR OS/2 WARP**

**Shortly after** Netscape Communicator 4.04 became available, Mike Kaply, IBM's



If images in the browser window are marred by horizontal white lines, read the instructions in the ReadMe file.

If the problem persists:

**1 Create a REXX command file** (it must have a .CMD extension but can have any name you like, for example REXX.CMD) containing the instructions shown below in Fig 1.

**2 Save the file** and run it.

**3 If the problem remains**, try changing the "2" to "1".

Mike Kaply goes on to mention some undocumented features of the browser, but there's one documented feature that didn't actually make the cut. Drag and Drop doesn't work — it's a priority of the next update. The undocumented features are entries you can easily add to the Prefs.js file which you can find in the \NETSCAPE\USERS\USERNAME subdirectory, where "USERNAME" is the login name of your profile.

#### [FIG 1]

```
/* */
call RxFuncAdd "SysLoadFuncs",
"RexxUtil", "SysLoadFuncs"
call SysLoadFuncs
call SysIni "USER", "FixPak", "Shift", "2"
```

**1 Communicator** will load Arial web pages with a Helvetica font if you set the following preference to true: `user_pref("os2.arial_pref", false|true)`

**2 To specify** a wave file for new mail sound (you must use double backslashes): `user_pref("os2.mail.sound", "C:\MMOS2\SOUNDS\GOTMAIL.WAV")`

**3 Prevent** filename mangling when downloading by setting to false: `user_pref("os2.replace_dots", true|false)`

**4 Turn off** URL bar completion if set to false: `user_pref("os2.url_completion", true|false)`

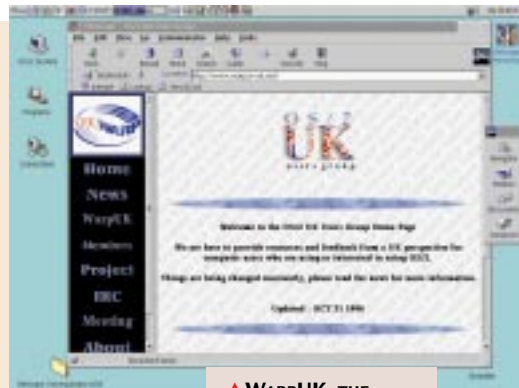
**5 User Defined Encoding** uses the default codepage of OS/2 if set to true. On Russian systems this allows you to see codepage 866 web pages. On default OS/2 systems you can see codepage 850 pages:

```
user_pref("os2.use_oem_charset", true|false)
```

## WE'RE IN IT TOGETHER

Chris Lindley writes to say that following a successful planning meeting in September, a group of OS/2 users is planning a formal launch of WarpUK, a user group for UK OS/2 SoHo users and hobbyists, at a meeting in January 1999.

You can obtain more information from Sid Gale on [sidg@btinternet.com](mailto:sidg@btinternet.com) or Chris Lindley on [chris@scotgate2.demon.co.uk](mailto:chris@scotgate2.demon.co.uk), or have a look at the web site at [www.warp.in-uk.net](http://www.warp.in-uk.net).



▲ **WARPUK, THE OS/2 USER GROUP FOR SoHo USERS AND HOBBYISTS, WILL BE LAUNCHED IN JANUARY**

#### ■ Electric blue

Nils Andreas Erstad wants to know whether OS/2 is "good for networking" and whether he can use the "blue edition" to connect a portable to his main computer. Nils doesn't say what's

running on his main computer, but it sounds like some version of Windows.

He also wants to know if a Toshiba 4400SX portable, a 25MHz 486 with 10Mb RAM, would be a way to run some 16-bit Windows programs.

First off, the "blue edition" sounds like Warp 3.0 with Win-OS/2 and that will indeed run 16-bit Windows programs in 10Mb if the Win-OS/2 support has been installed. It won't be happy with multiple Win-OS/2 sessions and lots of OS/2 applications, but it will be fine for average use.

If it's the "blue" Warp Connect or even Warp 4.0, then it will include networking and in this case 10Mb might be stretching it as networking takes up around 6Mb RAM. Together with the 4Mb RAM the base kernel needs, it adds up to 10Mb memory, and the number of applications you can load simultaneously will depend on how much swap space you can afford.

How easy it is to network the "blue edition" with another computer depends on the version of Warp. Warp 3.0 shipped in two different packages, one with a red spine, one blue. The "blue" version of Warp 3.0 is the one with

Windows built in, but it doesn't include any networking software other than the TCP/IP stuff in the Internet Access Kit in the Bonus Pack. The IAK TCP/IP stuff is for use over a modem and not easy to "fix" to use over a LAN.

**Warp 3.0 Connect** followed (in a blue package) and this does include LAN networking, in particular the OS/2 Peer software with which you can connect to other PCs running Warp Connect, and to Windows for Workgroups, Windows 95, Windows NT and so forth. Finally, Warp 4.0 (also blue) includes an improved version of the OS/2 Peer software. So, if you have Warp 3.0 Connect or Warp 4.0 then it's easy to network Warp and Windows. For a small home network the best bet is to use NETBIOS as the main protocol: it's fast, easy to set up, and browsing works from both sides — Warp and Windows.

If you want to have a go with TCP/IP networking, make sure to use the TCP/IP 3.0 software which you select as part of the network section of the install program, and not the TCP/IP 2.0 stuff that's in the IAK on the BonusPak. I've been lazy getting to grips with this because it makes my head hurt, but it's time I did. If you can't wait for me, John Summerfield's site at [www.ami.com.au/os2/](http://www.ami.com.au/os2/) and Jacco's OS/2 page at <http://carol.wins.uva.nl/~leeuw/os2.html> are good starting points.

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# That's entertainment

**Tim Nott shows how to brighten up your life, using the Office Assistant.**

**H**e's everybody's friend; everybody who uses Office 97, that is. He's smart enough to know when you are writing a letter (which you probably knew already) but seemingly never quite smart enough to pinpoint the help topic for which you're looking. I refer, of course, to the Office Assistant, commonly known as "that blasted paperclip", or robot, cat, bard, genius and so on.

Now, thanks to a pointer in the right direction from Akhil Shial, who wins a book token, you can get your revenge by putting words into the mouth of Clippit and his pals [Fig 1]. Akhil writes: "This will provide you and all the readers of your column with hours of entertainment and excitement as they make Clippit and his friends shout crude and vulgar statements." I'm sure PCW readers would never stoop to such behaviour.

**On a more serious front**, this does open the way to using the Assistant as an alternative to conventional message boxes in your VBA macros. If you look in

the help file mentioned below, you'll find that there's not only a high fun

Remember, you read it first in PCW!



**◀ FIG 2 PUT YOUR OWN WORDS INTO THE MOUTH OF THE FRIENDLY OFFICE ASSISTANT**

factor, with lots of animations

from which to choose, but that the balloon can be used to get user input. For example, the Show method can be used to return which button has been pressed, and you can also have other controls, such as check boxes, in a balloon. Many thanks to fellow-columnist Tim Anderson (*Hands On*

### [FIG 1] Macro to make the Assistant talk

```
Sub Speak()
    Set Balloon = Assistant.NewBalloon
    With Balloon
        .Button = msoButtonSetOK
        .Animation = msoAnimationBeginSpeaking
        .Text = InputBox$("Type a message")
        .Show
    End With
End Sub
```

### [FIG 3] Clear MRU macro

```
Private Listsize As Long
Sub DelMRU()
    Application.DisplayRecentFiles = True
    Set Balloon = Assistant.NewBalloon
    With Balloon
        .Text = "This will delete your recently-used file list"
        .Button = msoButtonSetOkCancel
        .Animation = msoAnimationBeginSpeaking
    End With
    buttonpressed = Balloon.Show
    If buttonpressed = -2 Then
        Set Balloon = Assistant.NewBalloon
        With Balloon
            .Text = "Ok, we won't do that then"
            .Button = msoButtonSetOK
            .Animation = msoAnimationGoodbye
            .Show
        End With
        GoTo skipped
    End If
    listsize = RecentFiles.Maximum
    RecentFiles.Maximum = 0
    RecentFiles.Maximum = listsize
    Set Balloon = Assistant.NewBalloon
    With Balloon
        .Text = "Your recent file list has been cleared and
        reset to hold " + Str$(listsize) + " files"
        .Button = msoButtonSetOK
        .Animation = msoAnimationGetAttentionMinor
        .Show
    End With
    skipped:
End Sub
Ends
```

*Visual Programming*), who pointed me at the correct help file for manipulating the Office Assistant: it's VBAOFF8.HLP. You'll also notice from the screenshot [Fig 2] that the Office 2000 beta version

has made a great leap forward in entertainment technology, in that the animated assistant breaks free of the confines of a window to exist as a free-range sprite.

## Questions & answers

**Q** I produce Word documents which contain a variety of symbols, for scientific text. I'd like to be able to find these and colour them red, say.

JEREMY ARDESLEY

**a** Amazingly enough, this is possible using some of the more esoteric options of Word's search and replace. If you enclose all the characters you want to find within square brackets, for example [ $\phi\%\$£$ ], then click the More button, you'll get an option to "Use wildcards". Tick this, then click in the Replace box without typing anything. Click the Format button, select Font from the list and choose the replacement colour. Clicking Replace All will find all instances of each symbol and change its colour. This even works with symbols you have placed using the Insert Symbol command.

**Q** Is it possible to remove words from the Word custom dictionary? I think I've pressed the wrong button and added some misspelled words.

BRIAN COULSDEN

**a** Yes, the custom dictionary is a plain-text file which can be edited in Notepad or Word. If you have trouble locating it, go to Tools, Options, Spelling and Grammar, and click the Dictionaries button. This will show a list of any custom dictionaries you have, and their locations. You can also edit them from here. If you want to be really crafty, untick the dictionary before opening it. You'll then be able to use the main spelling checker on the contents. Although this will query every word, the suggestions should alert you to mistaken additions.

**Q** When I open a document with dates in Word 97, the field automatically updates to today's date and prints as such. In the previous version of Word for Office 95 there was a facility in Tools, Options, General (if I remember correctly) which enabled me to keep the original date. However, I cannot discover how to do this in Word 97.

ERIC ADLER

**a** It depends on how the date was originally inserted. If the "Update automatically" box is checked in the Insert Date and Time dialogue, then Word uses a

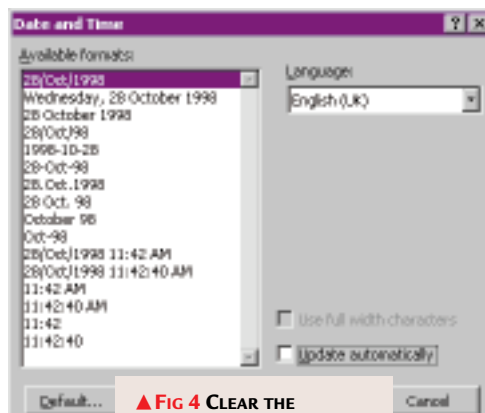
date field which is updated each time the document is opened or printed (or on demand). Unchecked [Fig 4], Word inserts the current date as text. Alt+F9 will toggle the display of field codes on and off so you can see which is which. You can lock a field (Ctrl+F11) to freeze it at the current value, which will stop existing dates from readjusting themselves.

**Q** We used to have only a few PCs and operators, but now there are over 70 of them. Sometimes we lose the information as to which PC/directory/user produced

but what I want is a suitable macro that would do this automatically when the user starts printing out the document.

MUSTAFA CAGATAYLI

**a** Why not use the document properties already built in to Word? Right-click, then Properties will show the name of the user who created the document, provided this information has been correctly entered in Tools, Options, User Information. If you want to add additional information, you can create custom properties which, again, can either be seen from



▲ FIG 4 CLEAR THE 'UPDATE' BOX IF YOU WANT THE DATE TO STAY PUT

the Office 97 document at hand. I know that it is simple to include a field combination which would add these details (and more) to the end of the document,

Word itself or by right-clicking on the file in Windows Explorer. You say that you have some programming experience, so I won't go into great detail here, but the VBA help file does. You can thus

easily create a custom document Property with Add Document Property, then assign the original path and filename to this with ActiveDocument.FullName.

### → Cover your tracks

More VBA from Bruce Kirby in response to a past request for a quick way of clearing Word 97's recent file list, as seen in the File menu. The idea is to clear the MRU (most recently used) list without removing the feature itself, should you not want other users of the PC, say, to know what files you've been working on. Bruce recorded a macro while he changed the relevant settings from the Tools, Options dialogue, then edited out the irrelevant bits. I've modified his

original code to save the number of entries in the list and dragged in the Office Assistant to provide a little light-hearted help [Fig 3]. Both pieces of code are also on this month's PCW CD-ROM.

→ **Annabel Cormack** offers a method of tidying text that has been pasted-in which contains carriage returns at the end of each line. Whereas my search-and-replace solution in November's column is handy for text that has been pasted into an existing document, Annabel's scores

better on long, free-standing texts. First, make sure the Tools, Options, General, "Confirm selection at open" option is ticked. Next, save the text as "Text Only with Line Breaks" and close the file. Finally, open the file again and, when prompted, open as "Text with Layout".

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# Cell mate

Confusion over the **contents of cells** is calmed by Stephen Wells. Plus, how to give a button more buzz.

**E**very cell in a spreadsheet contains at least two elements: the contents and its formatting. This can be very confusing to new users.

What goes in is often not what comes out. Here's a very simple little macro which points out the difference in Excel.

Start a new workbook to experiment with. Open the Visual Basic editor using Alt+F11. Choose Insert, Module. Enter the listing in Fig 1.

Click the Save button. Close the VBA windows. On the active worksheet enter a number. Format it as a number, or currency, to create an example. Press Alt+F8, then Enter. The macro will run and tell you the contents of the cell (what is stored there) and the format (how it is displayed). Fig 2 is a composite illustration of two examples. The dialogue box automatically sizes itself as required. This macro is in the Excel 97 file, Cell contents.xls, on this month's cover CD-ROM.

[FIG 1]

```
Sub Cellinfo()  
MsgBox "The contents is "_  
& ActiveCell.Value &vbCrLf_  
& "The format is " &  
&ActiveCell.Text  
End Sub
```

### ■ Better buttons

This file also illustrates something else: a better-looking button, as in Fig 3. The fastest way in Excel to create a button (which can be used to launch a macro) is to choose View, Toolbars, Form. Click the button tool and draw a button on your worksheet. This automatically opens the "Assign a macro" dialogue box and you can choose the one you need. Then Excel sets you in position to edit the wording on the button. Click elsewhere on the sheet and the job's done. However, it is very difficult to change the properties of that button beyond choosing a font for the labelling text.

To put a bit more pizzazz into a button, I suggest a different route. Click the Drawing button on the Standard toolbar. This displays the Drawing

► Fig 2 Two EXAMPLES OF A SIMPLE LITTLE MACRO WHICH TELLS YOU THE CONTENTS AND FORMAT OF A CELL

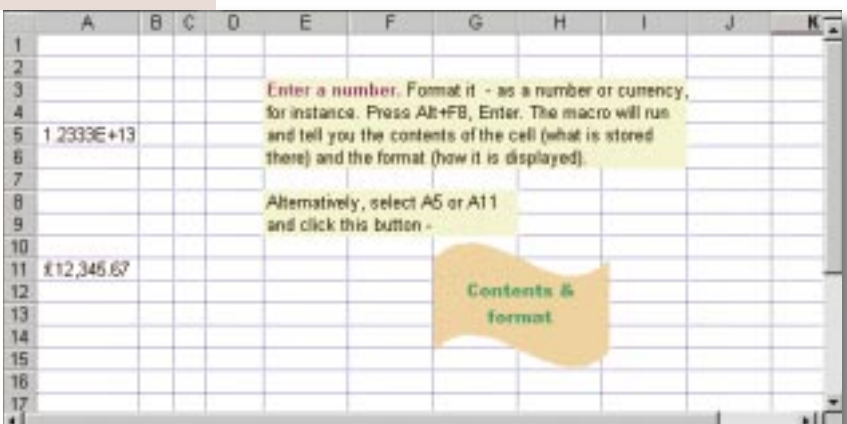
toolbar. Click on AutoShapes and make a selection. Draw it on your worksheet. Right-click and choose Assign macro, and select one. Right-click and choose Format AutoShape, and you have a lot more options, including colours for the face and outline of your "button". Right-click again and choose Add text, and enter the wording to appear on the button. Once you've created a few buttons this way, you'll be able to make them in a couple of ticks.

### ■ Tab name on the sheet

Two readers have come up with solutions for the problem of including the tab or worksheet name in a cell.

Kevin Tam emails: "A more elegant solution is to create this global function:

▼ Fig 3 You GET A WIDER CHOICE OF BUTTONS FOR YOUR WORKSHEET BY USING AUTOSHAPES ON THE DRAWING TOOLBAR



*The dialogue box automatically sizes itself as required*

```
Public Function -  
MySheetName() As String  
MySheetName = ActiveSheet. -  
Name  
End Function
```

"As before, open the Visual Basic editor using Alt+F11. Choose Insert, Module. Enter the listing. Save the file, then enter in any cell: =MySheetName()

## Questions

## &amp; answers

**Q** How can I centre text across a number of rows (not columns) with Excel? I am able to centre text across one row by using the Format, Cells, Alignment option, but this expands the width of the row by the length of the text rather than spanning the cells I have highlighted.

PHILIP WHITING

**a** Here's an example. Enter several words in cell A14. Then highlight A4:A14. Choose Format, Cells, and the Alignment tab. Under Orientation, select 90 degrees. Under Text alignment, choose Centre for Horizontal and Vertical. Under text control, check the

automatically records any overtime I do. As I am a contractor, this is quite important. However, I cannot get the cells to recognise that the numbers relate to times, and if I format a cell for this, it won't do the necessary calculations. Are there any ways to ensure that the figure in the cell is a time, and that allows any calculations to recognise that there are only 60 minutes to an hour?

GRAEME KING-SANDERS

**a** Format cells A1 and B1 with the built-in Date, 3/4/97 1:30PM. Format C1 Time, 13:30. Format D1 and E1 Number, 0 decimals. In A1 enter your start time as 2/2/99 7:30. It will display as 2/2/99 7:30 AM. In B1 enter your end time as 2/2/99 17:15. It will display as 2/2/99 5:15 PM. In C1, enter

B1-A1. This will display your hours and minutes worked as 9:45. In D1, enter =HOUR(C1)-8. This will display as 1. In E1, enter =MINUTE(C1). This will display as 45. So reading these two cells together, you've worked 1 hour and 45 minutes overtime.

**Q** Can I display, in Excel 5, cell

colours to represent values, by a change of variable in a formula and not by manually formatting each cell? The variables

representing the percentages are a,b,c,d. An "a" should turn the cell red, a "b", yellow, and so on.

FRANK MAIDSTONE

**a** Not in Excel 5, Frank, but you can in Excel 97 (Excel 8) using a

wonderful feature called Conditional Formatting. The choices of formatting dependent on cell values are extensive. You could create a formula using your a's and b's or work straight from the value, eliminating that step. Obviously, so many other Excel users want to do what you want to do, Frank, that the innovation was introduced.

**Q** How can I copy selected rows of an Excel spreadsheet to a Word table? When I click on rows 1,3,5 and 7, holding the control key, the rows are highlighted. I can paste just these rows into a blank sheet. When I do the same operation to a Word table, I get rows 1 - 7 inclusive! How do I restrict the paste to the selected rows?

KEITH RUNDLE

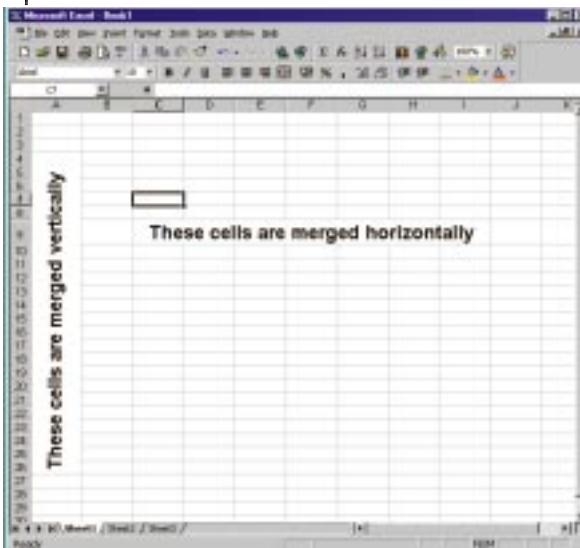
**a** It only takes a second to paste the selected rows into a blank temporary worksheet, copy again and paste into Word. Alternatively, copy the selected rows and then, in Word, choose Edit, Paste Special, Unformatted text, and make your selection.

**Q** Is it possible to change the colour on the workbook tabs in Excel? I know it can be done in Lotus 1-2-3, but I can't find a way to do it in Excel.

DENZYL PEREIRA

**a** You're right. I hadn't thought of it before, but upon checking I see that in Corel Quattro Pro 8 and Lotus 1-2-3 97 it is easy to change tab colours. In Excel 97, you can change the gridline colours easily but there is no offered option for titillating tab tints.

The VBA for Excel Tab object does offer colour properties: BackColour defines the colour of the tab, and ForeColour defines the colour of the text. But it's just for tabs in a dialogue box, not worksheet tabs.



Merge cells box. The number of cells you need to highlight will depend on the length of your text. The width of the rows won't expand if you pick enough rows.

**Q** I have compiled a spreadsheet that records my time at work and

## The VBA for Excel Tab object does offer colour properties

"You can also select the new function by clicking the equals sign in the Formula bar, then the down arrow on the

function box, and selecting it from the User Defined functions."

Meanwhile, long-term reader of this column, Shane Devenshire, in California, suggests the formula:

```
=MID(CELL("filename"),FIND(
{"[]",CELL("filename"))+1,31)
```

I've tried both solutions and they work easily. They can be found in the

Excel 97 file, SheetNaming.xls, on this month's cover CD-ROM.

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# Information emporia

**Mark Whitehorn on the pros and cons of data warehousing. It's very trendy, but is it useful?**

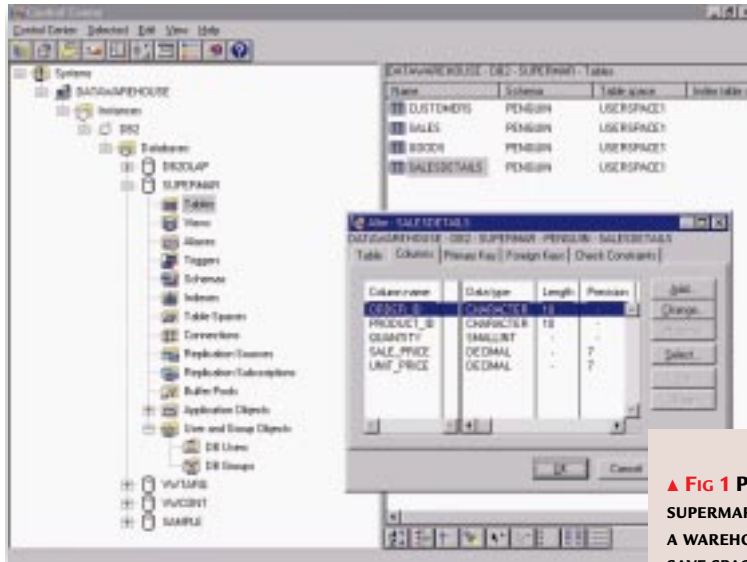
**T**here is a great deal of talk nowadays about data warehouses. Some people are even building them. I once carefully explained the principles of data warehousing to a friend. At the end of it, he said: "You mean, what I used to do ten years ago, without telling anyone, in order to make the system run faster?" The answer was "Yes". Very little is new in the database world; it just gets wrapped up in fancy words. On the other hand, the new words don't stop data warehousing being exciting, powerful and ultimately incredibly useful.

So, what is a data warehouse? We'll start from an operational database, defined in this case as a database into which one group of people regularly stuffs data and from which another group regularly extracts it. In other words, an operational database is a normal, regular kind of a database. But if you can put data in and get it out, why do you need a data warehouse? Well, because the first group of people generally ends up hating the second.

## Questions, questions

The main reason for the resentment is that some queries can totally sock the performance of an operational database. Consider a sales database for a supermarket [Fig 1]. Given those iniquitous "loyalty" cards that are so popular nowadays, we can expect the CUSTOMER table to contain a reasonable level of detail. We can also expect the tables to rapidly become non-trivial in size (millions of records). When a questioner asks, "What is the value of all fish-related sales to childless couples in Bradford?" the operational system is totally thrown because so many records have to be hit to answer the question, even with decent indexing.

**What is to be done?** The answer is a data warehouse. At its most basic, this is simply a copy of the database held on



**▲ FIG 1 PUT YOUR SUPERMARKET INTO A WAREHOUSE AND SAVE SPACE**

another machine. The operational database continues to be used for data input but all queries are run against the data warehouse. True, depending upon when and how frequently the copy is made, the answers to the queries will be out of date, but queries of this nature are rarely that time-sensitive. And, once you have separated the input function from the querying, you can do really nice tricks.

**For a start**, you can de-normalise the data in the data warehouse. "Woah!" you cry. "This is the man who has been advocating normalisation for years in this self-same column!" Sure I have: it's very important in an operational database because it helps to ensure that data is correctly input. But once you know that a database will never be used for input, one of the major reasons for normalisation disappears. And, when you realise that your data warehouse is freed from this particular constraint, there are other changes you can make to the structure.

**You might find**, for example, that your "querying" users never need the fine level of detail inherent in an operational system. They are unlikely ever to want to know exactly what Fred Smith bought on 1/7/1998. So, you may be able to summarise the data as it is brought into the data warehouse. Clearly, at this stage, you need to talk carefully to the people who do the querying, to get a feel for

what they typically run. However, the benefits can be immense, reducing query times from days to minutes.

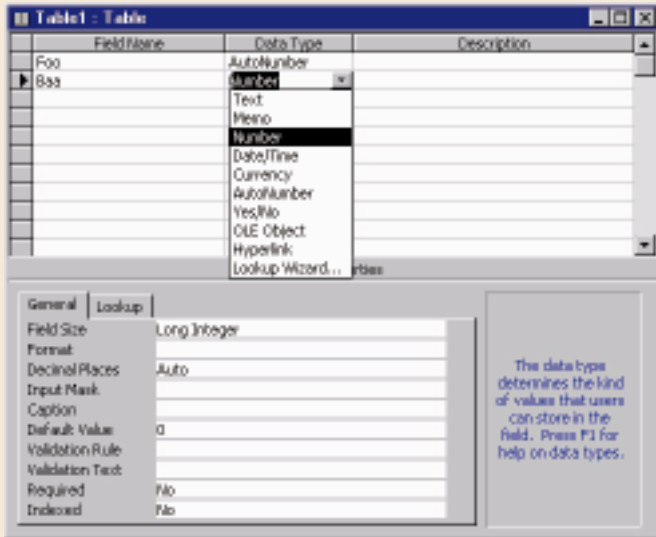
## All becomes clear

You may now be thinking, "But if a data warehouse is simply a copy of an operational database, why are they so intimidating, expensive and complex? And why do they need such expensive software and hardware?" These are all excellent questions. The answers are, that given a small(ish) database, in a small-to-medium-sized company, none of the above need apply.

**A data warehouse** is simply a way of working, an approach to manipulating data. It does not require huge complexity. There is nothing to stop you from setting up a query-only copy of your database simply to separate the query function from the input. This was exactly what my friend was describing.

Of course, once you start working with mission-critical, 24 x 7 x 365 systems, the data warehouse becomes complex. But then, the underlying operational database is already complex in these cases. For smaller systems, data warehousing can be a cheap, extremely cost-effective solution, and data warehouses offer other advantages — see next month's exciting episode.

## TIPS AND TRICKS: COUNTING ON A RELATIONSHIP



◀ **THE DATA TYPE DETERMINES THE KIND OF VALUES THAT USERS CAN STORE IN A FIELD**

key and you can make the relationship. On the other hand, you could enter the first company as 1 in a numeric “company ID” field, then for each new company run a lookup of a query against company IDs to identify the largest

number, add one, and write to the “company ID” field of the new company. Peter admits that both solutions are a bit untidy, but they solve the problem. He wonders: “Am I missing an easier way?”

Well, a brief bit of background first. Number fields in Access (and

RDBMSs in general) can be sub-typed as Byte, Integer, Long Integer etc. The default sub-type for a numeric field in Access 2.0 is Integer. A Counter field is actually just a numeric field (sub-type Long Integer) which happens to have special incremental features.

Therein lies the problem: a counter is a Long Integer and the default sub-type for a numeric field is Integer. These two are incompatible and hence you cannot join tables using these types.

I am impressed with Peter’s workaround, but yes, there is an easier way. Simply set the numeric type to be sub-type Long Integer, and all should be well. This problem magically disappears in later versions because Auto-Number, the replacement for Counter, is still a Long Integer, but this is now the default for Numeric fields in general.

Here’s an idea from Peter Thompson <[atcthomp@mail.gcc.com.bh](mailto:atcthomp@mail.gcc.com.bh)>. He says that if he uses a counter to set a “company ID” key field in a company table, and then tries to establish a relationship with enforced integrity with a “company ID” field in an order table, the action is refused because

the fields are not identical (one is counter, the other is number). He overcame this in one of two ways. On the one hand, you could make a new field in the company table, number type, and write the counter to this field, by macro, when entering a new company. This can then be set as the

## Recovery option

Reader John Blight <[john.blight@triaster.co.uk](mailto:john.blight@triaster.co.uk)> has commented on a recent *Hands On Databases* article (PCW, November ’98) about recovering corrupted Access databases. He has found that the compact process is very valuable in correcting strange, often inexplicable behaviour in an Access database: the record printing from a form could well be such an example. If one of his users reports such a problem, his initial advice is usually to compact the mdb files. He doesn’t know why the compact routine should be so effective in remedying corruptions, considering what

it is designed to do, but it certainly appears to be so. This is in addition to making often considerable savings in file size, and more efficient operation.

John says that a useful facility is to have a compact (and/or repair) option under the right-click menu of mdb files:

1. In any Windows Explorer-type window, select Options... from the View menu, then the File Types tab on the dialogue box.
2. Select whatever file-type is associated with the mdb extension, then click on the Edit... button.
3. Click on the New... button.
4. In the Action text box, type “Compact an Access mdb” or something else suitable.

5. In the “Application used to perform action” text box, type in the code shown in Fig 2. “%1” is the

mdb filename argument. Whether or not “%1” is within double quotes depends on whether the argument is being sent to an application which used long filenames; Access 2.0 doesn’t, Access 7.0 and 8.0 do.

6. Click on OK.

When you next right-click on an mdb file, you should have the option to “Compact an Access mdb”.

Nice one, John. I did know how to add to the right-click option, but had never thought to use it in this way. I’ve set up my own machine in the way you have described.

[FIG 2]

Type in:  
 <Path to Access 2.0> %1 /compact  
 or...  
 <Path to Access 7.0 or 8.0> "%1" /compact

## PCW CONTACTS

Mark Whitehorn welcomes readers’ suggestions and feedback for the *Databases* column. He can be contacted via the PCW editorial office (address, p10) or email [database@pcw.co.uk](mailto:database@pcw.co.uk).



# SIOL machines

I/O... I/O... it's off to work we go on **PCI buses**. Roger Gann looks at developments and conflicts.

**W**e've had the familiar PCI (Peripheral Component Interconnect) system bus for five years now, and those short, white expansion slots are now a familiar sight on all motherboards, not just those found in PCs. The PCI bus presented significant advantages over the old, 16-bit, ISA slot: with a 32-bit bus running at 33MHz, it offered twice the bandwidth and four times the speed; two things of which you can never have enough. In theory, the PCI bus could deliver 132Mbps, but in practice it topped out at around 90Mbps, the rest being taken up with overheads. On top of this, PCI offered other advantages, such as Plug-and-Play.

Just recently, servers have started to surface which sport 64-bit PCI slots running at 66MHz, further quadrupling data throughput. Yet even this kind of bandwidth will be stressed by up-and-coming technologies such as Ultra3 SCSI, Fibre Channel, FireWire and Gigabit Ethernet.

In September '98, Compaq, Hewlett-Packard and IBM announced the PCI-X bus specification and then submitted it to the PCI Special Interest Group. The new bus specification increases the PCI bus speed to 133MHz and increases the amount of data it can handle during each clock cycle to 66 bits, with a theoretical maximum data throughput of nearly 1Gb/sec. This initiative, on the part of the three server manufacturers, was a rather surprising move.

**Intel has struggled to deliver enterprise-related solutions**

**Intel was conspicuous** by its absence — it was the designer of the original 33MHz and 66MHz PCI bus standards. Some observers were surprised that it took major vendors like IBM so long to wrench the initiative from Intel. The chip giant has struggled to deliver enterprise-related solutions: Intel's Xeon has been affected by scalability issues, and the

much-vaunted Merced processor has been delayed until potentially 2000.

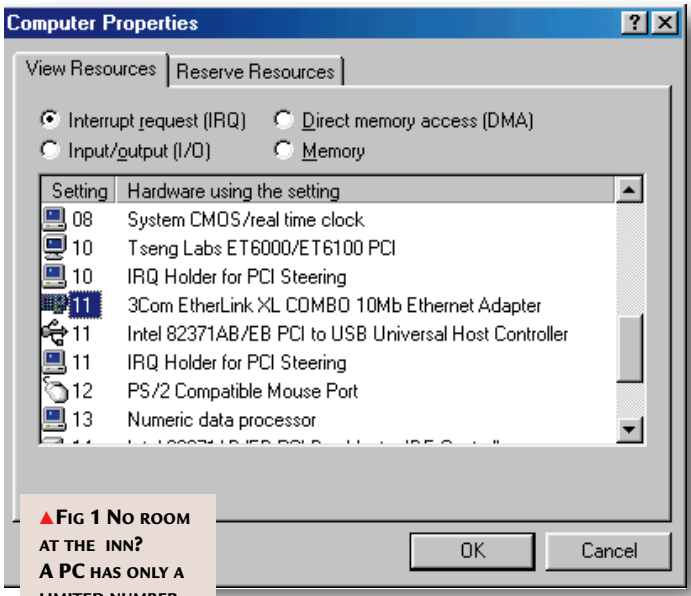
**The specification proposal** is aimed at addressing I/O bandwidth for servers running enterprise applications such as Gigabit Ethernet, Fibre Channel and Ultra3 SCSI. Currently, the fastest PCI bus design runs at 66MHz and can pass up to 64 bits of information per clock cycle. The bus standard found in the majority of servers and desktop computers is the slower 33MHz PCI bus with a 32-bit gate developed by Intel in 1993.

## The X factor

The new PCI-X specification features a new multi-slot design that has not yet been implemented. It will support one slot running at 133MHz, two slots at 100MHz and four slots at 66MHz. This allows for greater flexibility in implementation,

permitting different configurations for different applications. However, it's unlikely that even in the fastest one-slot configuration of 133MHz, the theoretical throughput of 1Gb/sec will be reached; 800Mb/sec is more achievable.

PCI-X also features an enhanced protocol to increase the efficiency of data transfer and to simplify electrical timing requirements, which is an important factor at higher clock



**▲ FIG 1 NO ROOM AT THE INN? A PC HAS ONLY A LIMITED NUMBER OF IRQS**

frequencies. Allowances for future capabilities are also provided. In addition, PCI-X is designed to accomplish this while remaining backwards-compatible with the current PCI bus. PCI-X is best used in "enterprise" storage and networking applications where there's a need to move data around the system.

## PORTABLE PCI

**I**t has been long mooted, yet at long last there seems to be movement on the PCI-for-notebooks front. Notebooks are too small to take conventional expansion cards, so users have to resort to docking stations or PC Cards whenever they need to plug something even slightly exotic into a notebook. A PCI Special Interest Group is looking at a new specification for a small-form-factor PCI solution, possibly a daughtercard, for notebooks. Apparently, the new PCI daughtercard could be implemented in a number of ways, perhaps on the side of a notebook in the form of a dongle connector, or wholly contained within a notebook.



**Intel responded quickly** to PCI-X by announcing a future bus technology at the IDF developer conference. Called Next Generation I/O, Intel claims it will bring mainframe-class links to PCs, internet working gear and networked peripherals. Intel has described NGI/O as a fast serial bus, “unchained” from host interrupts and better characterised as a switching fabric, linking a processor complex to internal and external systems peripherals. Phew!

## Resource conflicts

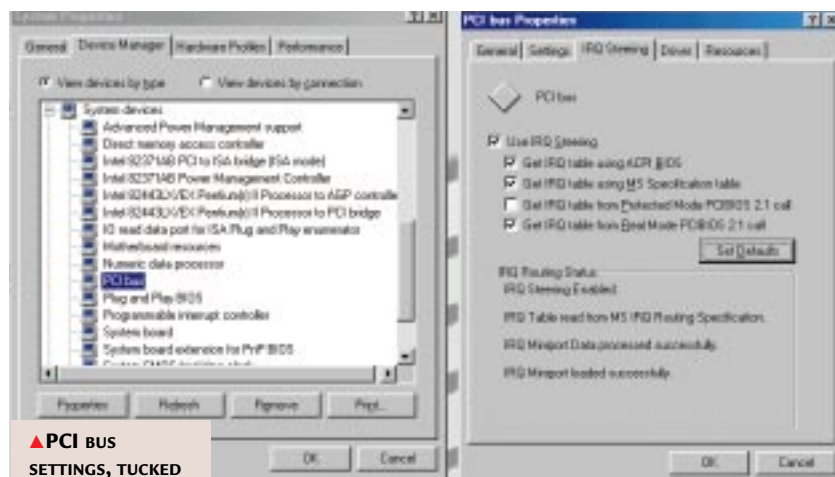
The most common resource conflicts involve interrupt requests, or IRQs, with ISA bus-based peripherals. IRQ conflicts have been the bane of end-users for many years but they’re becoming increasingly common because more and more computers are being shipped with few, if any, available IRQs.

Many moons ago (well, June 1998, to be precise) I was whingeing in this column about the chronic lack of hardware IRQs available in current PCs. I had found to my horror that some PCs actually ship from the factory with no free IRQs, so stuffed are they with add-ons. As a result, I found it incredibly difficult to install something as simple as a network interface card, a job which should have taken me and Plug-and-Play ten minutes at the most, but took me no less than three evenings to “kind of” sort out. The problem is that there are only 16 IRQs in a PC and typically only five or fewer are available for future expansion.

“Why not add more IRQs by installing additional interrupt controllers?” is one seemingly

simple solution to the IRQ famine, but this fix is typically only found in exotic hardware such as high-end workstations and servers simply because of the costs and complexities involved in implementing them.

**PC manufacturers** have, instead, tried to resolve the problem by a different approach, namely to avoid using IRQs. PCI was supposed to help out here but PCI devices often do use IRQs, sometimes multiple IRQs, which makes even fewer available for other devices



▲ **PCI BUS SETTINGS, TUCKED NEATLY INTO THE SYSTEM PROPERTIES DIALOGUE**

such as Plug-and-Play-compatible ISA cards. Resolving IRQ problems, far from getting simpler, has actually become harder.

Where you’re using ISA and PCI cards together, it appears that PCI devices generally have to use at least one IRQ to maintain compatibility with today’s operating systems. Perhaps in the future, when the ISA bus has disappeared courtesy of the PC 99 specification, PCI IRQs won’t be an issue, but for the moment they are.

**So what about PCI-sharing** (aka PCI Steering)? Multiple ISA cards can’t share an ISA IRQ, but multiple PCI devices can share a PCI IRQ. On computers that use a PCI bus, the 16 standard IRQs can be programmed to either PCI or ISA mode.

An IRQ cannot be programmed for both modes at once. The ability for several PCI devices to share that single IRQ is

largely determined by the computer’s BIOS. Some BIOSes have settings that let you enable PCI IRQ sharing, but many do not. If the BIOS doesn’t support sharing, PCI devices, including the PCI-to-Universal Serial Bus controller found in most new machines, will each use an IRQ. There are four shareable IRQs assignable to PCI devices, so if you fit four PCI cards, each will get its own unique IRQ. Add a fifth PCI card and it would automatically share with one of the first four devices. Two other PCI IRQs (15 and 16) are typically dual-PCI

Integrated Device Electronics (IDE) controllers found on most machines, but are not shared for reasons of backwards compatibility.

**In theory** you can, if you have Windows 95 OSR2.n or Windows 98, solve this problem by turning on an option called IRQ Steering. This was a little flakey under OSR2 but the Windows 98 implementation seems much better. By using PCI-bus IRQ steering, Windows can dynamically assign or “steer” PCI-bus IRQs to PCI devices. Note that the original releases of Windows 95 and Microsoft Windows 95 OSR1 don’t provide support for PCI-bus IRQ steering. In these releases, the BIOS assigns IRQs to PCI devices.

With OSR2, if PCI-bus IRQ steering is disabled in Windows, the BIOS assigns IRQs to PCI devices. But if PCI-bus IRQ steering is *enabled*, Windows assigns IRQs to PCI devices. In the latter case, the BIOS still assigns IRQs to PCI devices, and even though Windows has the ability to change these settings, it generally doesn’t.

PCI-bus IRQ steering gives Windows 95 OSR2 and later the flexibility to reprogram PCI interrupts when “rebalancing” Plug-and-Play PCI and ISA resources around non-Plug-and-Play ISA devices. In Fig 1 [p277] you can see that my network interface card is using IRQ 11, as is the USB controller. Both are PCI devices, so the IRQ they’re using (IRQ 11) can be shared.

Note that there’s an IRQ Holder for PCI Steering sitting on that IRQ as well. An IRQ Holder for PCI Steering indicates that an IRQ has been programmed to PCI mode and is unavailable for ISA

**You can take an IRQ horse to water but you can’t make it share**





## THE NEW ULTRA DMA/66 INTERFACE

**H**ard on the heels of a faster PCI bus comes a faster hard disk. About now, hard-disk drives sporting the new Ultra DMA/66 interface will begin to appear. Also known as Ultra ATA/66, this new interface is a low-cost extension of the previous Ultra DMA/33 hard-drive interface that doubles its burst data transfer rate to 66.6 megabytes per second; twice that of Ultra DMA/33's 33.3Mb/sec. Hard-disk data transfer rates have been doubling every few years: in 1994 we had DMA Mode 2/PIO Mode 4 running at 16.6Mb/sec, and in 1997 we had Ultra DMA/33 at 33.3Mb/sec. In 1999, it's time to double it yet again.

**Ultra ATA/66** also delivers improved data integrity to the EIDE interface through the use of a new-style 40-pin 80-conductor cable and

Cyclic Redundancy Check (CRC) error detection code. The new cable still has 40 pins, but each data cable is now shielded by its own "ground cable" which reduces crosstalk and improves signal integrity.

**The new Ultra DMA/66** connector remains plug-compatible with existing 40-pin headers and the extra cost for the cable should be minimal. Ultra ATA/66 hard drives will be backwards-compatible with Ultra ATA/33 and DMA, and with existing EIDE/IDE hard drives, CD-ROM drives and host systems.

As hard-disk capacities mushroom and rotational speeds continue to accelerate, so the drive's internal transfer rate increases. The transfer of

large files, often written sequentially on the hard drive, is particularly affected by the transfer rate. During sequential reads, the hard drive, because of its fast internal data rate, may fill its buffer faster than the host can empty it when using the Ultra ATA/33 or the older multi-word DMA interfaces. Improving the

*Real-world gains delivered by Ultra DMA/66 won't be earth-shattering*

interface to keep up with internal data rate improvements is just what Ultra DMA/66 can achieve.

Although 66.6Mb/sec sounds a lot, the day-to-day real-world gains delivered by Ultra DMA/66 won't be earth-shattering (the 66.6Mb/sec figure is a burst-mode value): sustained data

transfer rates will be but a fraction of this. Its benefit will be most noticeable during long sequential operations such as replaying audio or movie clips. To use Ultra ATA/66 technology, a PC must have:

- Ultra ATA/66 compatible logic either on the system motherboard or on an Ultra DMA PCI adapter card.
- Ultra DMA compatible BIOS.
- A DMA-aware device driver for the operating system or an Ultra ATA/66-compatible IDE device like a hard drive or CD-ROM drive 40-pin 80-conductor cable.

You'll need no special Windows 9x drivers to avail yourself of the performance benefits of Ultra DMA/66. As long as Windows 9x is currently using DMA mode transfers, then it will be Ultra DMM/33 or 66 "agnostic" when you upgrade your hardware.

	Data Transfer Rate (max)	Connector	Cable	CRC
DMA Mode 1	11.1Mb/sec	40-pin IDE	40-way	No
Multi-word DMA Mode 1	13.3Mb/sec	40-pin IDE	40-way	No
Multi-word DMA Mode 2	16.6Mb/sec	40-pin IDE	40-way	No
Ultra ATA Mode 2	33.3Mb/sec	40-pin IDE	40-way	Yes
Ultra ATA Mode 4	66.6Mb/sec	40-pin IDE	80-way	Yes

devices, even if no PCI devices are currently using the IRQ.

Windows 95 OSR2.n disables IRQ steering by default. To turn it on, open Control Panel, then click on the System applet and open the Device Manager tree. Scroll down to the System Devices item and get the properties of the PCI bus. One of the items here is IRQ Steering. IRQ Steering and the associated "Get IRQ Table from PCIBIOS 2.1 Call" checkbox allow Windows 9x to help manage the assignment of PCI devices to IRQs, taking over some of this capability

from the BIOS. As you can see from Fig 2 [p278], IRQ steering is enabled and working OK. Sometimes, as an aid to troubleshooting conflicts, you may have to progressively uncheck these options.

IRQ steering is a godsend but don't forget you can take an IRQ horse to water but you can't make it share. In some cases, although they ought to, some PCI devices simply refuse to share IRQs.

Finally, here's one last-resort trick that's worth a spin: try moving a PCI card to a different PCI slot. On many PCs, the internal PCI Interrupts,

commonly labelled A-D, are actually assigned to individual slots instead of individual cards. Often you can specify which slot gets which IRQ in CMOS setup. Because the PCI Interrupts are each commonly mapped to different IRQs, making this move can change the IRQ that a PCI card uses.

### PCW CONTACTS

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# Playing at home

**Record, edit and master your own CDs at home. Steven Helstrip shows you how.**

**O**ver the next few months we're going to tackle the basics of recording, editing and mastering your own audio CDs at home. On the way, we'll look at how to get the best from your sound card and how to record synths into your sequencer, and we'll include hints and tips to help you polish your home recordings. Even if you don't have access to a CD writer, there will still be lots here to interest you.

## Transferring MIDI tracks to audio tracks

To prepare a two-track master which can be used to write an audio CD, MIDI tracks from your sequencer, including those played from a sound card, need to be recorded to your PC as audio files. If your music is purely MIDI-based (i.e. there are no sequenced audio tracks) this is pretty straightforward.

➤ **Using your sound card's** mixer utility, select Record Options and mute all the inputs except for MIDI.

➤ **Simply set** your wave editor into Record mode and play back your MIDI sequence. This will record all FM, WaveTable and SoundFont instruments.

➤ **Because we're preparing** an audio file for a CD, ensure the sampling rate is set to 44.1kHz 16-bit stereo. More than likely, you'll have a couple of audio tracks lined up in your sequencer and will need to transfer your MIDI tracks over. Not only will this allow you to create a two-track mixdown of your song, but you'll also be able to process MIDI parts with plug-in effects and EQ.

For maximum flexibility, record MIDI instruments to as many separate tracks as possible. You can always bounce, say, all the drums down to a stereo track once you have a mix you're happy with.

**MIDI instruments** can be recorded to audio tracks using the same approach we've just covered. However, if you also have external synths playing, these must be connected to your sound card's line

## FAST GUIDE TO CUBASE VST

**C**ubase has come such a long way over the years that sometimes I wonder how newcomers to the program ever get off the ground. MIDI and audio are complex enough issues by themselves, but when they're thrown together in a full-blown professional package, where do you turn for help?

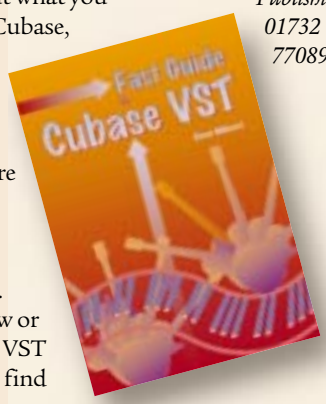
Whether you're looking for quickstart tutorials or involved in mixing projects, the *Fast Guide to Cubase VST* could be just what you're looking for. The book covers most MIDI and audio topics in detail, and includes excellent chapters on Logical Edit, audio editing and mixing with

VST. The author, Simon Millward, is clearly a proficient Cubase user and has plenty of sound advice (no pun intended) to offer, including the use of plug-in effects and EQ, through to choosing and setting up the right sound card. It's not just about what you can do with Cubase, though. The program's limitations are clearly revealed, as are the potential problems you're likely to encounter. If you're a new or intermediate VST user, you will find this book to be an

excellent supplement to the online Cubase manuals. It is well written and packed with practical tips, although there really wasn't any need to include another list of general MIDI instruments.

**Price** £19.95 (inc VAT)  
**Contact** PC

Publishing  
01732  
770893



## NEW — SOUNDBLASTER LIVE



**I**recently checked out the new SoundBlaster Live sound card. I was so impressed with its output quality that I installed an Event Gina, a £500 professional audio card, alongside it to do an A/B comparison. For the various listening tests I monitored each card's

performance over a pair of Tannoy studio reference monitors. Suffice it to say, there was little to set the two cards apart. The Live has a very clean and detailed output with virtually no discernible levels of noise. Add to this 256 voices of polyphony from its three onboard synthesisers, and the

ability to use up to 32Mb of your PC's system RAM for sampling, and you have a very desirable card for making music with your PC. Given the asking price of just £130, I'd recommend it highly.

**Contact** Creative Labs  
0118 934 4744  
[www.soundblaster.com](http://www.soundblaster.com)

## Winner of Terratec Home Studio

In the September '98 column we ran a competition to give away a Terratec Home Studio, comprising an EWS 64S sound card and a full-size, four-octave MIDI controller keyboard. We were swamped with entries, but the first out of the bag was from Martyn Comerie in Nottingham. Well done, Martyn!



### Questions

### & answers

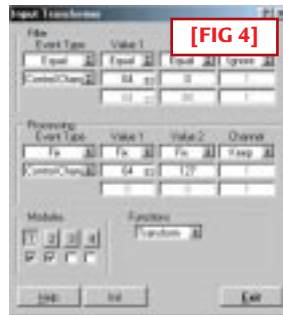
**Q** I have purchased Cakewalk Pro Audio 7 and I'm having a lot of fun with the audio effects. The problem I have is working out delay times in milliseconds to match the tempo of the music. Is there a formula I can use?

DAVID SAUNDERS

**a** There certainly is: a quarter-note delay (crotchet)=60/tempo. Try using multiples and divisions of this, for rhythmic variation. For example, dividing the result by four will give you a

semi-quaver delay. Multiply this further, by three, to produce a dotted quaver delay which is useful for semi-quaver-based synth patterns. For stereo delay, simply double or triple the delay time for the opposite side.

**Q** Having just upgraded my MIDI controller to a seven-octave piano-weighted keyboard, my sustain pedal no longer works properly with my sound card (a Turtle Beach Pinnacle). It now works in reverse, in fact, and is active when the pedal is released rather than pressed. This makes it



[FIG 4]



[FIG 5]

impossible to use. Is there a MIDI fix for this, or will I need to buy a new pedal?

PAUL CUSICK

**a** I have come across this problem myself. There are two options. Depending on the model, there may be a polarity switch inside the

pedal, which will solve the problem easily. If not, there is a "fudge" you can implement if you use Cubase: using the Input Transformer, you can convert sustain pedal on events (CC64:127) to sustain pedal off events (CC64:0) and vice-versa. Figs 4 & 5 show the settings you need.

### FREE PLUG-INS

Collecting plug-ins can be an expensive hobby, especially when some of the better ones can set you back up to £300 apiece. In fact, some of the best are available for free. As I write, there are already over 80 free plug-ins, many of which can be downloaded from the Cubase web ring. Three in particular have caught my attention this month: Vellocet's Reorder [Fig 1], Prosoniq's NorthPole [Fig 2] and KwikKomp 2 [Fig 3] from Synchronmesh.



◀ **FIG 1** REORDER SPLICES DRUM LOOPS INTO 16 PARTS AND RECYCLES THEM TO CREATE NEW GROOVES. YOU CAN REVERSE ANY PART AND CROSS-FADE BETWEEN SPLICES FOR GLITCH-FREE PLAYBACK

For the current list of Cubase web-ring sites, visit [www.webring.org/cgi-bin/webring](http://www.webring.org/cgi-bin/webring).



▲ **FIG 2** NORTHPOLE IS A FOUR-POLE ANALOGUE FILTER WITH LOW- AND BAND-PASS SETTINGS, ADJUSTABLE RESONANCE, AN ENVELOPE FOLLOWER AND BUILT-IN DELAY

▶ **FIG 3** KWIKKOMP IS AN ANALOGUE-STYLE COMPRESSOR OFFERING RATIO, THRESHOLD, ATTACK, DECAY AND GAIN MAKE-UP PARAMETERS. IT'S EASY TO USE AND CAN ADD A LOT OF PUNCH TO INDIVIDUAL DRUM SOUNDS



input. For the best possible recording, ensure the synth's output and MIDI volume are set to maximum, as this will improve the signal-to-noise ratio. If you're running low on audio tracks,

group like-minded instruments together.

We'll look at the processing options in next month's *Hands On Sound*. In the meantime, in the panel above are details of plug-ins you can get for free.

### PCW CONTACTS

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# Push the button

Interactive web pages are a doddle... if you do them the Ken McMahon way.

**W**hy do so many web pages look so dull? At least part of the reason must be that producing exciting, interactive graphic pages requires a degree of technical know-how most people don't even want to think about. So anything that makes the task easier has got to be A Good Thing. Step forward Metacreations Painter 5.5 Web Edition. The software best known for its "natural media" tools which mimic the real stuff — oil, canvas, watercolour, pastel, crayon and the like — has been upgraded to include a raft of web authoring facilities.

## Slice and dice

Most exciting of these, for me at least, is the Image Slicer which, like most of the additions, is a plug-in floater.

The Image Slicer pretty much automates the task of

*Anything that makes the task easier has got to be A Good Thing*

dividing up large images into bite-sized chunks and slotting them back together in an HTML table. Why? Because big images can take several weeks to download, so slicing them up means you can compress the bits that will take it (flat colour backgrounds, for example) while maintaining quality in the bits that won't, e.g. photos. Painter's new Image Slicer takes on another real chore: the creation of Javascript Rollovers. So now you can have interactive buttons without all the grief of having to code and test them yourself.

Very briefly then, here's how to create a sliced-image HTML table with Javascript buttons in Painter 5.5 Web Edition. Before you do anything else, make sure you have all the components ready. My graphic has three two-state Javascript buttons and they alter their appearance when the Javascript events *mouseout* or *mouseover* occur — in other words, they change colour when your mouse pointer is over them. You can use three-state

► **THE IMAGE SLICER AT WORK. EACH SEGMENT IS NAMED AND OUR THREE BUTTONS HAVE TWO STATES, ON AND OFF**



rollovers which have a third appearance (mousedown) if you like. Since my buttons have two states, there will be two export operations:

one for the mouseout state and one for mouseover. I've therefore got two floaters: one with all the buttons in the off state and another with them all on. Designate the "on" floater the bottom one and make

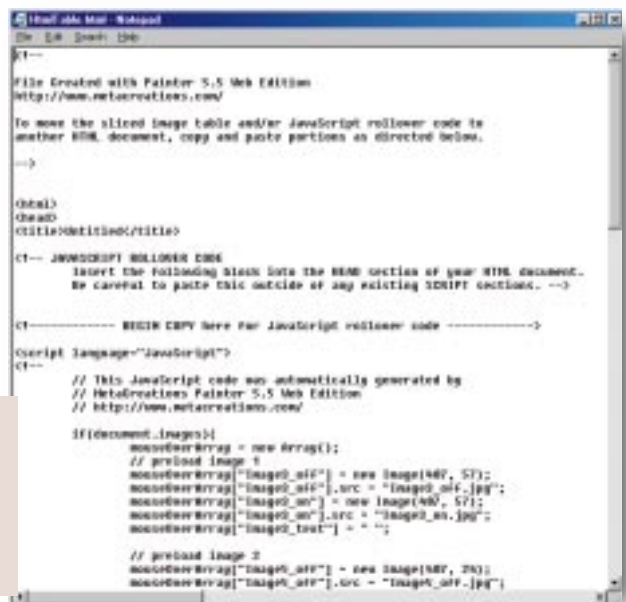
sure it's not visible on-screen by clicking the "eye" icon in the floater list. Let's deal with the default "off" page first.

Select the Image Slicer from the front drawer of the plug-in floaters palette and click Apply to pull up the Image Slicer dialog box. There are three slicing tools, for dividing the image horizontally and vertically, and for creating an intersection. The fourth tool is a segment selector. Each time you divide the image, the segments are named sequentially from left to right and down the page,

► **PAINTER 5.5'S AUTOMATICALLY GENERATED HTML AND JAVASCRIPT, COMPLETE WITH CUT AND PASTE INSTRUCTIONS**

and then added to the pulldown list. You can enter a link URL and an ALT label which will display in the window while the image is loading.

The page is now divided into ten segments. We are only going to export images one, three, five and seven, since there is nothing in the other bits. But they could, for example, contain other images or dynamic text. If you don't want to export part of the image, you can just select "No export" in the File-type pulldown. If you inadvertently create a slice in the wrong place, you



## Questions & answers

**Q** I took one of my three CorelDraw books on holiday with me to give me a chance to read it properly.

I noticed the "Creating Images for the Web" section and thought I'd have a go at it. I'm adequately familiar with HTML but not Java and definitely not Corel Barista. I created a drawing and used the "File/Publish To Internet" option to save it, and all I can ever see on my browser is a large square box, whether I use Netscape or Explorer and whether I publish a drawing or text.

The book says I can publish directly to HTML or Corel Barista, but I'm stuck with Barista as the only option. Any ideas on how to proceed would be most appreciated.

FRED BURNETT

**A** There are four options for exporting files using the Publish to Internet command from the File menu in CorelDraw 7. You can simply export your graphic as a gif or jpeg bitmap image, you can create a Barista file, or you can export your graphic as an HTML image map. In this last case Draw creates two files — a gif file of the map graphic, and an HTML document containing a reference to the gif and all the relevant HTML code to make it work as a client-side image map.

Once you assign a URL to an object in your drawing, you can define the hotspot — the area you click to access the linked document. To use an object as the hotspot, click Toolbars from the View menu, enable the Internet Objects check box and click OK. Select the Internet Object with the Pick tool and click the

Use Object Shape to Define Hotspot button in the Internet Objects toolbar.

If the internet toolbar isn't displayed, right-click any toolbar and click Internet Objects from the pulldown menu. When you export to the image map, Draw will save the graphic as Graphic1.GIF and the HTML as Graphic1.HTM. If the Export to Image Map option is greyed out or not working, it's probably because you haven't got the image map filter installed. You need to insert CD 1 and re-run the installer. Select Custom Setup and uncheck every single box in the Component panel (so you're installing no applications), then hit the Next button which will take you to the Filters panel. Expand the Internet Filters menu and check the second option — the Corel image map htm — then follow the rest of the installation procedure.

can delete it by Ctrl-clicking. The five sections on the right — two, four, six, eight and ten — can be grouped. The documentation states that if these contained a single background colour, you could export it as a single gif file with a small palette, say 4 bits per pixel. However, I'd be worried that adjacent areas with the same background but a different file format and palette, would display differently.

**Once the slices** are defined, you're ready to export the HTML table and images. Don't forget to define the rollover state for the buttons using the pulldown at the bottom. Click the Export settings for the Current image state button and in the Export Slices options panel specify the location for the HTML and images, click the Include Javascript button and set the rollover state — mouseout. Check the location you specified to make sure you have an HTML file for the table and an image for each of the segments exported.

### Float away

Next, turn all the buttons on by making the "on" floater visible in the list, and still in the floater list, double-click the Image Slicer floater to bring up the dialogue again. If you add a new floater at this stage, make sure to reposition the

Image Slicer floater at the top of the list, as it only works on floaters below it. In the Export Slices options panel select mouseover as the state and uncheck the export HTML box. You should now have an HTML table, image one (the logo) and two files for each of images three, five and seven in on and off states.

**This was the first time** I'd attempted this with Painter 5.5 and, to be quite honest, I wasn't expecting it to work. At best, I thought, I'd get everything in the right place but the rollovers wouldn't work. So you can imagine my surprise when the page appeared in Explorer 4 looking absolutely perfect and with three working rollovers.

I'm no Javascript or even HTML expert, so I couldn't say if Painter's automatically generated code is particularly elegant but I do know it



▲ **SUCCESS,  
AND SO QUICK!  
THE FINISHED  
ARTICLE IN  
EXPLORER 4**

works. I also know that creating this first effort took me about half an hour, and the first, last and only time I ever attempted to hand-code an HTML page with Javascript rollovers took me the best part of a week.

### PCW CONTACTS

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# Low key 3D

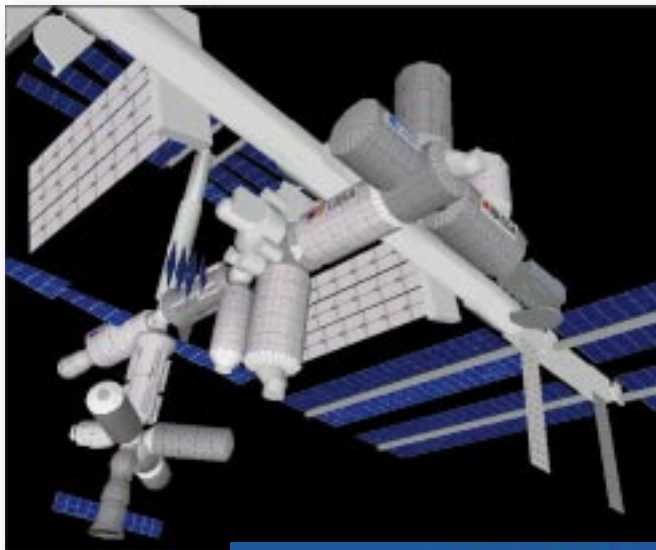
Is VRML finished as a tool to bring 3D to the web? Benjamin Woolley considers the alternatives.

In February 1997 I wrote a column about the one type of content that no medium other than the internet could deliver: shared virtual worlds. Various companies had announced important-sounding initiatives which would establish a standard for this new form of entertainment. It was just, we confidently predicted, a matter of time; yet the past two years have been filled with false starts and unfulfilled promises. A number of initiatives have come to nothing and 3D remains a low-key presence on the ever-spreading web. But it would be premature to think that 3D has no place on the net. This month, I want to consider some of the factors and ideas that look set to change its fortunes.

## Always the bridesmaid?

When VRML, the 3D equivalent of HTML, was first introduced, some of its more enthusiastic supporters imagined that one day it would prove just as popular as its 2D equivalent. Like HTML it was platform-independent, accepted throughout the internet community and was relatively easy to implement. In some respects, it has been a success. For example, it now provides a convenient (if limited) file format standard for exchanging textured objects between different 3D packages, as the latest versions of nearly all of them include some sort of VRML conversion facility. There are limitations, of course. VRML does not support the more complex texturing and animation functions. Still, at least it's there if you are trying to swap 3D data and have no suitable alternative.

**VRML has proved** less successful when it comes to doing what it was designed to do: bring 3D to the web. VRML sites are still relatively rare. Where Java is now almost universal and even proprietary standards such as Flash and RealAudio are common, VRML, even where it would be appropriate, is still a novelty. There are sites devoted to various aspects of VRML, such as the very useful Repository



◀Fig 1 NASA's VRML version of the International Space Station

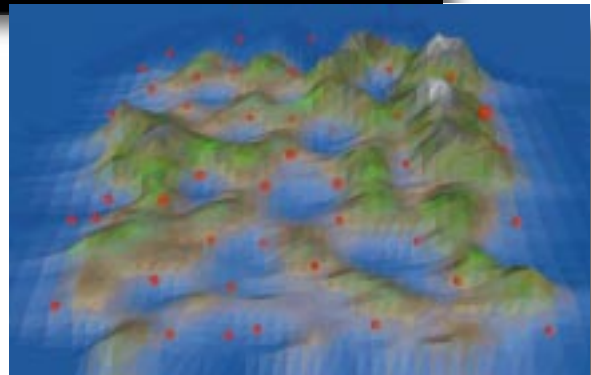
▼Fig 2 The VRML landscape generated from a web site by BITTco's NEURALVRSite

at [www.sdsc.edu/vrml/](http://www.sdsc.edu/vrml/) and the excellent directory maintained by the portal company Miningco at [vrml.miningco.com](http://vrml.miningco.com). There are also some interesting VRML sites to be found.

NASA, for instance, has an excellent model of the new Space Station [Fig 1] at [station.nasa.gov](http://station.nasa.gov).

Companies are also still trying to find new uses for VRML. Bittco, at [www.bittco.com](http://www.bittco.com), for example, has come up with the innovative idea of NeuralVRSite, a tool that will turn HTML sites into VRML versions. The red globes [Fig 2] represent links to bookmarked sites featured on the HTML page. It looks nice but seems rather pointless, as the depth of information which the third dimension provides is not actually put to any meaningful purpose.

**Despite these efforts**, VRML remains on the margins. Part of the problem is that so many sites seem reluctant to use the standard in a standard form. Many insist that you view their VRML world



using CosmoPlayer (which can be downloaded from [cosmosoftware.com](http://cosmosoftware.com)). Cosmo supports a number of non-standard features which make scenes written specifically for the Player incompatible with other viewers. This would be fine if Cosmo looked likely to become a *de facto* standard, but its original developer, SGI, has just sold it off to a much smaller company, Platinum, which is apparently interested in developing it as a more business-orientated tool.

Other sites have rejected VRML altogether, such as the one advertising the Millennium Dome Experience <[www.dome2000.co.uk](http://www.dome2000.co.uk)> [Fig 3]. This uses Superscape's Viscage which is like VRML but can only be viewed using Superscape's viewer (which now also supports VRML but not, in my view, very effectively).

**One could argue** that VRML's bumpy development is related to the lack of hardware needed to see it in its full glory. Like USB devices, there is always the hope that majestic herds of VRML sites will come thundering onto the scene just as soon as there is a sufficient number of systems out there to run real-time 3D at decent frame rates (i.e. Pentium II/AMD K6-2 systems with 3D acceleration).

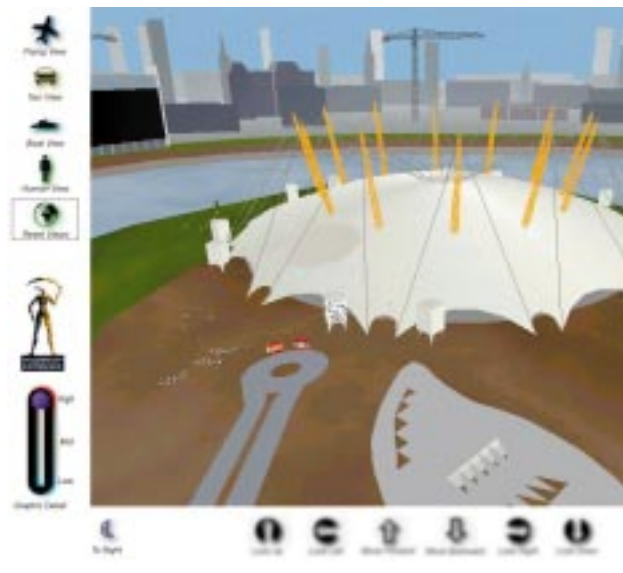
## Commercial content

In fact, the arrival of more powerful 3D hardware seems to have muddied the waters. Suddenly, the commercial possibilities of online 3D content are looking far too promising to leave to a non-commercial standard. We now have 3D initiatives popping up all over the web, each promising to provide the technology that will bring the third dimension to the internet.

In a commendable display of pragmatism, the VRML Consortium, which is responsible for maintaining the VRML standard, has decided to reflect this by balloting members about a fundamental change in its charter. No longer will it be concerned with a single standard, but with the development of online 3D technologies in general; issues such as "streaming" (which allows content to be rendered progressively as it is sent down the line), file compression (essential to 3D's successful development, as textured object data remains such a fat media type), and integration with the successors to HTML, XML and DHTML (the eXtensible and Dynamic Hypertext Markup Language standards).

**To reflect** these radical alterations, the VRML Consortium proposes changing its name to the Web 3D Consortium, thus making it clear that its existence is no longer solely about VRML. Indeed, it may even presage VRML's eventual replacement with a more elaborate API along the lines of Open-Gl or DirectX.

Interestingly, and encouragingly, there are also moves for the Web 3D Consortium to support the open source-code movement pioneered by Linux. It plans to promote the source code for 3D technologies to be made public on a similar basis. Sun has already set the ball rolling by making the source code for its Java3D-based VRML 97 browser freely



◀**Fig 3**  
SUPERSCAPE'S  
RENDITION OF  
THE  
MILLENNIUM  
DOME

▼**Fig 4**  
A CHROME  
TUBE,  
SQUISHED  
USING  
SQUISHYFX



available via its web site (at the time of writing, it could be found at the Java developer site [developer.java.sun.com/developer/](http://developer.java.sun.com/developer/)).

The Consortium's move is a wise one because the 3D arena is quickly fragmenting into an unmanageable series of incompatible initiatives. Needless to say, the company which seems to have been instrumental in accelerating this process is Microsoft. As reported in the October '98 *3D Graphics* column, Microsoft issued dark mutterings about the inadequacies of VRML and has since started to push an alternative approach.

## Chrome again

It was initially called Chrome and has since been renamed Chromeffects. It is concerned with more than 3D content and will enable developers to "deliver compelling new content enhanced with Chromeffects and powerful new tools and capabilities to catalyse innovation and new market opportunities," as the press release pretentiously puts it.

**A few examples** of the types of effect Chrome will deliver have been put on the Microsoft web site at [www.microsoft.com/windows/chromeffects/](http://www.microsoft.com/windows/chromeffects/) and they are undoubtedly impressive. One is called Metastreams. Developed by Metacreation, it enables 3D objects to be "streamed" over the line, so the low-resolution object you view initially, progressively becomes more detailed as more data arrives.

My favourite rejoices in the name SquishyFX. This is a technology which enables a form of

physics to be added to 3D objects that appear on a web page [Fig 4]. It is brilliantly implemented, enabling, among other effects, all sorts of bouncy, wiggly and squishy deformations to be applied to a simple model, in response to the user's mouse movements. It can even render the results using such advanced features as environment mapping (i.e. reflections).

I urge anyone who wants to see how much fun you can have with 3D to visit the Squishy web site at [www.squishyfx.com](http://www.squishyfx.com) and download the demo.

## Commanding presence

The problem with Chromeffects is that it will only work with Windows — why else do you suppose Microsoft would develop it? Fortunately its competitor, Java, may even draw strength from Microsoft's presence. A set of platform-independent 3D commands have now been added to the language and it must surely only be a matter of time before they become widely used.

## PCW CONTACTS

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# Making contact

To Outlook, everything is a message. But how do you get that message across? Tim Anderson explains.

**T**he Outlook contact manager is a handy way to store addresses, with strong features like integration with the Outlook calendar and synchronisation with Windows CE palmtops. Integration with the rest of Office, though, is poor. A common question is how to use user-defined fields in a Word mail-merge operation. I don't know of any way to do so without custom programming.

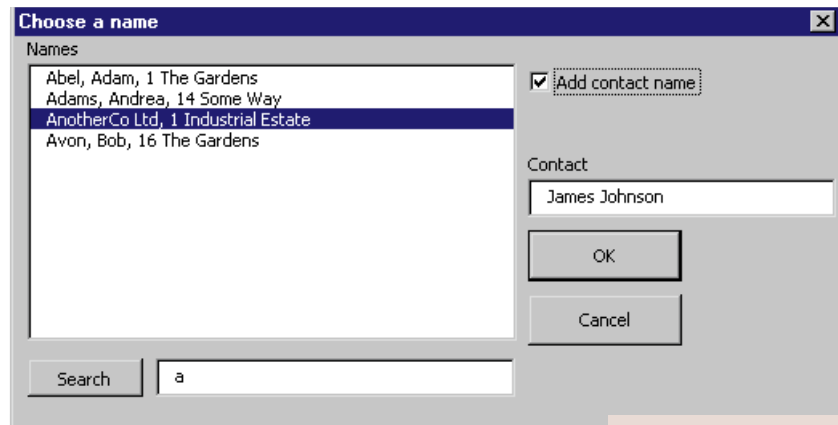
The next snag is that Outlook is harder to program than the rest of Office. The problem is not so much the use of VB Script rather than VBA, but Outlook's strange object model along with some surprising design features. The problem seems to be that Outlook's origins as a mail client have unduly influenced the Personal Information Manager features. To Outlook, everything is a message.

I recently completed a solution that uses Outlook contacts as a data source for Word, with access to user-defined fields. The basic requirement was for a VBA macro in Word to show a dialogue letting you search the Outlook contacts folder. Pick a contact, and the macro will insert field values into a Word document. We can't show the whole solution here, but the following tips give you all you need to know.

## How do you use a custom form?

To design an Outlook custom form, open a contact (for example) and choose Tools, Forms, Design this form. There is a control toolbox and a field chooser, and you can include ActiveX controls by right-clicking the toolbox and picking the Custom control option. Form, View code opens the very basic script editor.

The tricky bit is how to use the form. If you simply save your customised form, it is saved only with the specific contact you have been working on. To have the Contact folder use your form as the default, take two further steps. With the form open, choose Tools, Forms, Publish form. Unless you are running Exchange Server, the natural home for custom forms is the Personal Forms Library,



▲ THE COMPLETED SOLUTION IN WORD SEARCHES MATCHING NAMES AND RETRIEVES ADDITIONAL INFORMATION FOR A SELECTED CONTACT

available from the combo box in the Publish Form dialogue.

Next, close the form and go to the folder list. Choose View, Folder List if it is not already showing. Right-click the Contacts folder and choose Properties. Drop down the "When posting to this folder" combo box and choose Forms. Find your custom form. When you select it, look at the bottom of the dialogue and note the Message Class. This will be something like "IPM.Contact.MyContact", depending on the name you chose when publishing the form. Note this for future reference.

Now you will find your custom form is used when you create a new contact. Unfortunately, any existing contacts still use the old form. This is because the form used by a contact is determined by its MessageClass property, which you can only access programmatically. Fig 1 [p294] shows a possible script, which you can run from a button on an Outlook form.

A handy tip is to create a new contact and call it Utility. Use this to store house-keeping scripts such as one that updates the MessageClass. You can also use it to store global variables. You need to publish the Utility form, even though it is used by only one item, to prevent warning messages about dangerous macros.

## What is the unique identifier for a contact?

Trick question. As far as I can tell, there is no such thing. Internally there probably is, but it cannot be accessed. A data

source without a unique identifier for each record is a hopeless case, so the answer is

to create one. There are many ways to do this, but the approach I took was to create a custom property in the utility contact, using the New button on the All fields tab. I called this MaxID. It stores a number representing the last used ID number for a contact.

The next step is to use a custom form for new contacts in the folder. Add an event handler for the Open event. Fig 2 [p294] shows code that reads the last-used ID, increments it by one, and uses the result for the new ID. I chose to store the ID in the built-in Customer ID field, but you could also use a user-defined field. Be sure to set it to 0 in the form you publish, otherwise the code in Fig 2 will not work.

If this is a multi-user system using Net folders, you could append the username to the ID. Otherwise there is a risk of duplicates. Another possibility would be to query an external database. This would let you link an Outlook contact with an Access or SQL Server record, the beginnings of a true integrated system.

Fig 2 uses the Typename function to discover if the utility contact has been found. The contact is a COM object, and if the Find method fails, the contact variable will have an invalid reference. Typename is able to test its validity without raising an error in the process.





[FIG 1]

### Changing the MessageClass

```

Sub CmdUpdate_Click()
Set ns = application.Getnamespace("MAPI")
Set flder = ns.Folders("Personal Folders")
Set cts = flder.Folders("Contacts").items

If ct.FileAs "Utility" Then
' don't update utility form
ct.MessageClass = "IPM.Contact.MyContact"
ct.save
End If
Next

msgbox "All done"

End Sub

```

contact's UserProperties collection. The ID is important because it lets you put search results in a list box, using the ID to retrieve the chosen contact. If you have used VBA in Word, you will find it easy to extend this by placing field values at bookmarked points in a Word template, for example.

[FIG2]

### Adding a unique ID

```

Function Item_Open()

If item.CustomerID = 0 then
Set cts = item.parent.items
Set utilitem = contacts.find("[File As]='Utility'")

If TypeName(utilitem) = "Nothing" then
Msgbox "Error finding utility item"
Else
Set utilfld = utilitem.userproperties.find("MaxID")
NewID = utilfld.value + 1
item.CustomerID = NewID
utilfld.value = NewID
utilitem.save
End If

End If

End Function

```

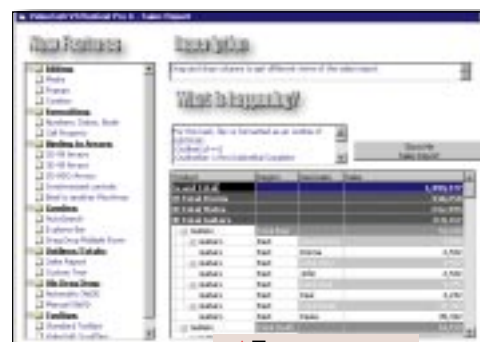
#### How do you search contacts from Word?

Outlook's object model is accessible from Word. The starting point is to open Word's VBA editor, choose Tools, References, and check the Outlook 98 Type Library. Fig 3 [p296] shows how you can get a reference to the Contacts folder, sort it, and search for an individual contact. Sorting is optional, but important if you want to display a list of matches.

Fig 3 also shows how you can retrieve the value of a user-defined field, by means of the Find method of each

#### A more flexible grid

Nice product, shame about the grid. This was a common VB complaint in its early days, and although the FlexGrid in Visual Basic 6.0 improves on previous efforts, there is a lot more you can do with a grid. Doubtters need look no further than VideoSoft's FlexGrid Pro. Supplied on one modest floppy disk together with a printed manual, this is the grown-up version of the FlexGrid bundled with VB. It can be bound to either DAO (Data Access Objects) or new-style OLE DB data sources, with read-write access to the data and mask editing available.



▲ THIS FORM HAS TWO FLEXGRID CONTROLS, BOTH USING THE OUTLINE FEATURES OF VS FLEXGRID PRO

VsFlexGrid has many features. It is an outline control as well as a grid, or possibly a hybrid grid-outline, since you can easily create outline grids that hide and expand groups of rows. The Explorer bar lets you click on a heading to sort by that column, and autosearch provides incremental search when the user types on the grid. Autosize columns work as you would expect. ScrollTips show a tooltip as you drag the scroll thumb, revealing the contents of the current row, and an OwnerDraw property lets you write code for the DrawCell event, for total control over what is displayed.

Another nice feature is OLE drag-and-drop, which lets you drag text from the grid to the likes of Word or Excel without using the clipboard. You can also drag-and-drop columns to group data. For applications that make serious use of a grid, VsFlex is recommended.

As a bonus, the VsFlexString component bundled with VsFlexGrid is a pattern-matching control, so that you can search and replace strings using wildcard expressions.

#### Stringing along

Ed Ross writes: "I would like to know about API functions: how to access them from Visual Basic, particularly the GetUserName function. I've added the declare from the API viewer." Brunel Kirby asks: "I am having a serious problem with passing strings to and from a Delphi 4 DLL, when using VBA from Word 97 as the calling application. My code is given below." [- code continues on next line.]

```

function StringFunction(P1 : Integer) : String; stdcall;
begin
Result :=3D 'Brunel';
end;

```

The problem here is that strings are



[FIG 3]

## Code to search Contacts from Word

```

Sub SearchContacts()
Dim ol As Outlook.Application
Dim flder As Outlook.MAPIFolder
Dim cts As Outlook.Items
Dim ct As Outlook.ContactItem

Set ol = CreateObject("Outlook.Application")
Set flder = ol.GetNamespace("MAPI").Folders("Personal -
  Folders")
Set cts = flder.Folders("Contacts").Items
cts.Sort "FileAs", False

'Find a contact
Set ct = cts.Find("[File As] = '" + "Utility" + "'")

If TypeName(ct) = "Nothing" Then
MsgBox "Contact not found"
Exit Sub
Else
MsgBox "Contact name: " + ct.FileAs
MsgBox "Customer ID: " + Str(ct.CustomerID)
MsgBox "Max ID: " + Str(ct.UserProperties.Find -
  ("MaxID").Value)
End If

End Sub

```

*[→ code continues on next line]*

[FIG 4]

## Calling GetUserName from VB

```

Private Declare Function GetUserName Lib -
  "advapi32.dll" Alias "GetUserNameA" -
  (ByVal lpBuffer As String, nSize -
  As Long) As Long
Private Sub cmdShowUser_Click()
Dim sUser As String
Dim lRetVal As Long
Dim lSize As Long

lSize = 255
sUser = String$(lSize + 1, " ")
lRetVal = GetUserName(sUser, lSize)

If lRetVal < 0 Then
sUser = Left$(sUser, InStr(1, sUser, Chr(0)))
'could use lSize which also now contains length -
  of string
MsgBox "User name: " + sUser
Else
MsgBox "Function failed"
End If

End Sub

```

*[→ code continues on next line]*

more awkward to manage than other data types. Since a string is really a set of characters, they are usually managed by means of a pointer variable. This contains the address of the string's starting point. The end of the string is

either marked by a special character, or determined by a length parameter stored with the string. The C language uses the former method, called null-terminated strings, while Basic and Delphi use the second approach but in slightly different

ways. The Basic string, or BSTR, is also used by COM.

Ed and Brunel both need to return string values from a DLL function called by Visual Basic. The most common way to do this is to declare the string in VB, allocate some space to it, and pass it to the DLL function as a ByVal parameter. This appears to the DLL as a pointer value. This works fine, although you should check for the position of the null terminator otherwise you may find spurious characters in the string. Fig 4 shows an example.

Brunel could use the same technique with Delphi. Instead of returning a string, the function could take a pchar parameter and copy the required value into it [*→ code continues on next line*]:

```

function StringFunction -
  (strvar : pchar): longint; -
  stdcall;
begin
  strcpy(strvar, 'Brunel');
  Result := 1;
end;

```

This can be called from VB in a similar way to GetUserName. For a safer function, include a MaxLen parameter as well. Then you can allocate MaxLen characters in VB, less one for the null terminator, and use StrLCopy at the Delphi end to ensure that only MaxLen characters are copied. Another possibility is to have a second function that returns the string length.

Finally, Brunel could use the TBstr type, declared in Delphi 4's ActiveX unit, to return a Basic string [*→ code continues on next line*]:

```

function VBStringFunction: -
  TBstr; stdcall;
var
  sVar: string;
begin
  sVar := 'Hello from Delphi';
  Result := sysAllocString -
  (PWideChar(sVar));
end;

```

## PCW CONTACTS

Tim Anderson welcomes your queries and tips. He can be contacted c/o the PCW editorial office (address, p10) or email [visual@pcw.co.uk](mailto:visual@pcw.co.uk).

VsFlexGrid Pro costs £199 + VAT (£233.83) from Contemporary Software 01344 873434. Further information and trial version at [www.videosoft.com](http://www.videosoft.com).



# The heat is on

Bob Walder tackles **firewalls**, a crucial weapon in the war against corporate hacking.

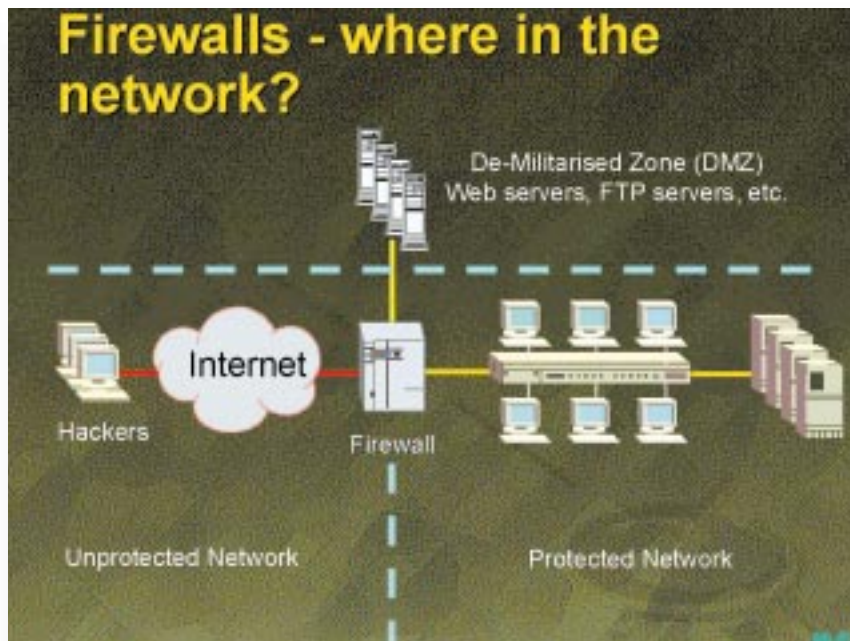
In previous columns I have covered the mystic world of IP addressing, WINS, DNS, routing and internet connectivity. Anyone who has followed this little lot and actually got as far as connecting their network (big or small) to the internet will no doubt be worried sick about all those nasty little hackers out there just waiting to break in, rifle their server's disks for juicy data, and wipe everything clean or install terrible viruses, before disappearing back into whatever adolescent world they inhabit. What do you mean, you hadn't even considered it?

One in five respondents to a recent survey admitted that intruders had broken into, or had tried to break into, their corporate networks, via the internet, during the preceding 12 months. This is even more worrying than it sounds, since most experts agree that the majority of break-ins go undetected. For example, attacks by the Defence Information Systems Agency (DISA) on 9,000 U.S. Department of Defence computer systems had an 88 percent success rate but were detected by less than one in 20 of the target organisations. Of those, only five percent actually reacted to the attack, says the National Centre of Supercomputing Applications (NCSA).

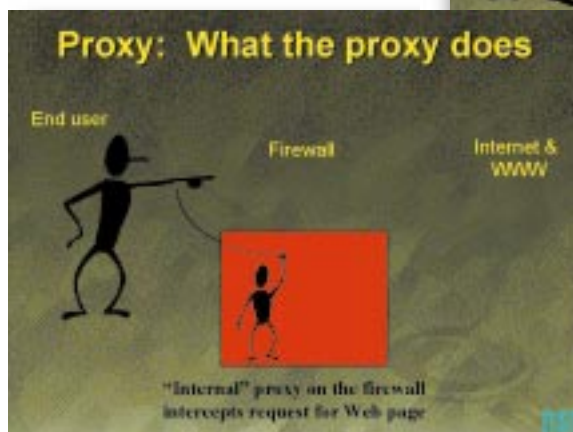
## Mind the gap

So, is there anything you can do about it? Plenty, as it happens, so I thought I would set you on your way by covering the subject of firewalls: how they work, and how you use them.

Essentially, a firewall should be thought of as a gap between two networks — in our case, an internal network and the internet — occupied by a mechanism that lets only a few selected forms of traffic through. The important thing to remember is that there are three main firewall architectures currently in



- ▲ **KEEPING THE BAD GUYS OUT: A FIREWALL IS A NETWORK'S MEANS OF PROTECTION AGAINST DANGEROUS NET ELEMENTS**
- ▶ **ALL NET TRAFFIC CAN BE CONSTANTLY MONITORED USING A STATEFUL INSPECTION FIREWALL**
- ▼ **PROXY SERVERS ACT AS INTERMEDIARIES IN CLIENT/SERVER OPERATIONS**



network address of the packet and a number of rules defined by the administrator. Packet filtering is fast, transparent (no changes are required at the client), flexible and cheap: most routers will provide packet filtering capabilities, and pure packet filter firewalls do not require powerful hardware.

### Dynamic Packet Filtering/Stateful Inspection

Some vendors are touting this as the "third generation" of firewall architectures, but it's really just an extension of the basic packet filtering architecture employed by most routers. Stateful Inspection occurs low down in

use.  
 ▶ **Static Packet Filtering** Working at the Network Layer (i.e. very low down) in the OSI stack, packet filters make simple deny or permit choices depending on the



## BEHIND THE MASQUE

Another important feature of today's firewall is Network Address Translation (NAT). This is also occasionally referred to as "IP Masquerading". Here's how NAT works. When one of the machines on your internal LAN wants to communicate with one elsewhere on the internet, it sends a packet to the firewall using its normal IP address. On its way through the firewall, the packet is altered — its return address is

replaced by the IP address belonging to the firewall itself. All responses to those packets therefore come back to the firewall. The firewall then reverses the address-swapping process and passes the reply straight back to the target computer.

**Why is this useful?** First, the outside world never gets a glimpse of the addressing structure of your protected network. Everything looks as though it is coming from a

single address — that of the firewall. This then gives rise to a useful side effect. If the internal address is never seen by the outside world, there is no need for any of the computers behind the firewall to have legitimate IP addresses. This provides complete freedom for your internal IP numbering system. There are several groups of IP addresses which are considered to be "reserved" and are never actually used on the internet,

making them ideal for use in an internal numbering system protected by NAT. They are: 10.0.0.0 to 10.255.255.255; 172.16.0.0 to 172.31.255.255; and 192.168.0.0 to 192.168.255.255

The use of NAT also means that the firewall will allow any number of machines on the LAN to share a single, legitimate IP address, thus making your internet connectivity costs that much lower.

the network stack, at the MAC or Network Layer, thus making it fast and preventing suspect packets from travelling up the protocol stack to the operating system above (never a good thing!). Unlike static packet filtering, however, Stateful Inspection makes its decisions based on all the data in the packet, corresponding to all the levels of the OSI stack.

The state of the connection is monitored at all times (hence Stateful Inspection), allowing the actions of the firewall to vary based on the administrator-defined rules and the state of previous conversations. In effect, the firewall is

capable of remembering the state of each ongoing conversation

across it, thus allowing it to screen all packets for unauthorised access while maintaining high security, even with connectionless protocols such as UDP.

➔ **Proxy Servers** Working very high up at the Application Layer of the OSI stack, a Proxy Server firewall acts as an intermediary for user requests, setting up a second connection to the desired resource either at the application layer (an application level gateway) or at the session or transport layer (a circuit-level gateway).

Proxy code is effectively split into two

halves, and actually "stands in" for both client and server operations, relaying valid requests between the trusted and untrusted networks via the proxies. For a simple client request to retrieve a web page, the proxy server fools the client into thinking that it (the proxy) is the required web server. It then passes the request to its "external half", which pretends to be the client making the request. As far as the outside world is concerned, the protected internal network does not exist — all that is visible is the external portion of the proxy. The web server passes the page back to the proxy, which transfers it to the internal

proxy, which finally passes it on to the user's web browser. Unlike Packet Filter and Stateful Inspection firewalls,

a direct connection is never allowed between the two networks. The penalties paid for this level of security, however, are performance — Proxy Server firewalls have large processor and memory requirements in order to support many simultaneous users, and flexibility — the introduction of new internet apps and protocols can often involve significant delays while new proxies are developed to support them.

While static packet filtering alone is usually confined to the router these days and not considered strong enough for

enterprise-class firewall devices, the differences between the remaining two architectures are negligible. True proxy servers are the safest, but impose a severe overhead in heavily loaded networks. Dynamic packet filtering is definitely faster, though most high-end firewalls are hybrids these days, using elements from all three architectures.

**Most of the currently** available products are available as dual or tri-homed gateways: they have two or three separate network interfaces for the internal, external and "De-Militarised Zone" (DMZ) networks. The DMZ adds extra protection for the internal network, providing a secure subnet which allows internal web, FTP and mail servers to be accessed from both the trusted and untrusted sides of the firewall without compromising security. Even if an attacker on the external segment manages to compromise machines on the DMZ, everything on the inside remains guarded by the firewall.

A DMZ is the only safe way of allowing external users access to some of the servers on your site.

### PCW CONTACTS

Bob Walder can be contacted via the usual PCW editorial office (address, p10) or email [networks@pcw.vnu.co.uk](mailto:networks@pcw.vnu.co.uk).



# Universal solution

At last, Apple has adopted USB. Cliff Joseph explains this 'PC technology' and what it has to offer.

**R**ight, before any of the PC mob writes in to gloat that PCs have had USB for ages, I will freely acknowledge that Apple has been a bit slow to adopt this useful and versatile new interface technology. Still, Apple has always had a tendency to go off and do its own thing, so the fact that it has seen sense and decided to join the rest of the industry in using USB is actually quite an encouraging sign. Hopefully it's an indication of a new realism at Apple, and an understanding that it sometimes makes more sense to go with the flow of PC technology than to continually fight against it.

All this talk of USB has been prompted by the launch of the iMac. The little Bondi Blue marvel has been selling like hot cakes, and Apple UK's recent deals with Dixons, Curries and PC World should have given it a much higher profile over the Christmas period. The iMac is the first Apple product to use USB, but Apple wouldn't be Apple unless it did something to complicate the USB issue just a little bit.

It's the decision to rely totally on USB for connecting peripherals to the iMac that's causing the problem. Many common peripherals, most notably printers, are still using older parallel port connections and have not yet made the switch to USB. So, for those people who got iMacs for Christmas, I thought I'd do a short update on the availability of USB peripherals. More important, though, is the fact that Apple also plans to use USB across the entire Mac range in the future. So this seems like a good time to take a look at this new technology to see what it has to offer Mac users.

## Smart move

The iMac aside, Macs all use non-standard interfaces to connect to external peripherals. They don't have PC-style parallel ports, opting instead



for an interface known simply as the Apple Desktop Bus (ADB). They do have serial ports, but, needless to say, Mac serial ports are not the same as PC ports so most peripherals manufacturers just don't bother to produce Mac versions of their products. The adoption

## The adoption of USB is a pretty important step for Apple

of USB is therefore a pretty important step for Apple. It means that all the USB peripherals can also work with the iMac and other new Macs that also have USB. The other big advantage of USB is that it provides much higher data transfer rates than conventional parallel and serial ports. This makes it really useful for connecting devices such as scanners and digital cameras which generate very large file sizes.

With digital video devices such as the popular QuickCam, the USB version can produce larger image sizes and better image quality than older parallel or serial versions. It's also easy and convenient to

▲ NEW USB PERIPHERALS SUCH AS LOGITECH'S QUICKCAM WILL WORK BOTH WITH PCs AND APPLE'S NEW IMAC

use USB peripherals, as USB allows you to connect or remove devices without having to turn your computer off each time.

So, USB is definitely a good thing. The problem for the iMac is that there are relatively few USB peripherals currently available, although the numbers are growing rapidly. At the moment, the only USB printer available in the UK is Epson's Stylus 740. This is actually sold as a PC printer and costs about £250 (inc VAT). To connect it to an iMac you need an additional cable that costs £6 and you also need to download the iMac printer software from Epson's web site.

## Get kitted out

Hewlett-Packard hasn't yet got around to producing any USB printers, but it has produced an adaptor kit called the Printer Cable Kit for iMac. This costs £69



### DUAL-PLATFORM PRINTERS

Earlier in this column I mentioned the lack of peripherals available for the Mac as a result of Apple's use of non-standard interface technology. This should be less of a problem in the future as USB is adopted by new Mac models. But right now, one of the most common questions asked by new Mac owners is, "Can I use a PC printer with my Mac?" The answer is yes, but you'll need

a little help. Macs use a serial port to connect to printers, while PCs use a parallel port. So, to physically connect a PC printer to a Mac, you first of all need a serial-to-parallel adaptor cable. Then, of course, you need a piece of driver software to control the printer itself. Some companies, such as Epson and Hewlett-Packard, do have Mac drivers for some of their

printers which can be freely downloaded from their web sites. However, those companies are the exception rather than the rule.

**The solution** is a product called PowerPrint, developed by GDT SoftWorks (now owned by InfoWave). PowerPrint costs about £93 (inc VAT) and includes the required adaptor cable along with a CD-ROM which contains

drivers for literally hundreds of PC printers. These include colour inkjet and laser printers, and even some old dot-matrix ones. I use PowerPrint to hook up my own Mac to an HP LaserJet 4L and it works perfectly. So, if you have an existing PC printer or you want to buy one of the many cheap PC printers now available, PowerPrint could easily save you the cost of a brand-new Mac printer.

(inc VAT) and can be used to connect an iMac to several printers in HP's DeskJet 670 and 690 ranges. Additionally, as we went to press, InfoWave was preparing a USB version of its PowerPrint package which should allow you to use just about any PC or Mac printer with the iMac (see box, above). We have neither a confirmed price nor shipping date for this, though, so keep an eye on the mail order advertisements for further details.

### Digital pictures

One area where USB is really taking off is in the field of digital imaging. This includes digital cameras, scanners and web cams, those little cameras that are used to broadcast live video across the internet. Logitech, which now owns the former Connectix QuickCam range, has just

released a USB version of the QuickCam VC (£93 inc VAT) which runs on the Mac, and the new QuickCam Pro should be available early in 1999. Pace Micro will also be releasing a Mac version of its USB Colour Camera soon.

**This USB stuff** is all well and good if you've got an iMac, but there are still millions of people using existing Macs which just have plain old ADB. Fortunately there is a way of using new USB peripherals with non-USB Macs. A company

### There is a way of using new USB peripherals with non-USB Macs

called Keyspan has developed a number of USB adaptor products, including a PCI card that provides two USB connectors. Just slot the card into a free PCI slot inside your Mac, and you're free to use any USB peripheral which has Mac drivers available for it.

**Keyspan also produces** a USB-to-ADB adaptor which allows you to connect older ADB peripherals, such as graphics

tablets and joysticks, to the iMac. Both products cost about £69 (inc VAT) and are distributed

in the UK by AM Micro which also handles products from Newer Technology. As we went to press, Newer was due to release a cheap USB-based floppy disk for the iMac (UK pricing has yet to be confirmed).

Space permitting, in this column we may cover occasional updates on other USB products, but for regular updates you should check out the iMacWorld web site at [www.imacworld.com](http://www.imacworld.com).

### PCW CONTACTS

Cliff Joseph can be contacted via the PCW editorial office (address, page 10) or email [mac@pcw.co.uk](mailto:mac@pcw.co.uk)

**iMac Printer Cable Kit** £69 (£58.72 ex VAT) Hewlett-Packard 0990 474747

[www.hp.com](http://www.hp.com)  
**Stylus 740** £250 (£212 ex VAT)  
Epson 0800 220546  
[www.epson.co.uk](http://www.epson.co.uk)

**USB-to-ADB adapter** £69 (£58.72 ex VAT) AM Micro 01392 426473

[www.ammicro.co.uk](http://www.ammicro.co.uk)  
**QuickCAM VC** £93 (£79.15 ex VAT)  
Logitech 0181 308 6582  
[www.logitech.com](http://www.logitech.com)

► THE EPSON STYLUS 740 IS THE ONLY USB PRINTER AVAILABLE IN THE UK AT PRESENT





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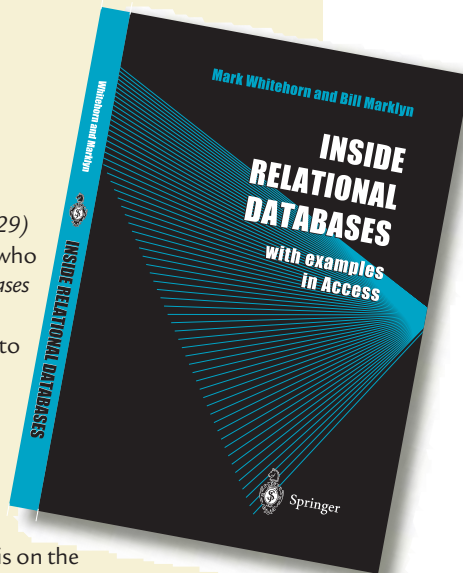
## Inside Relational Databases

(reviewed in PCW November 97, p329)

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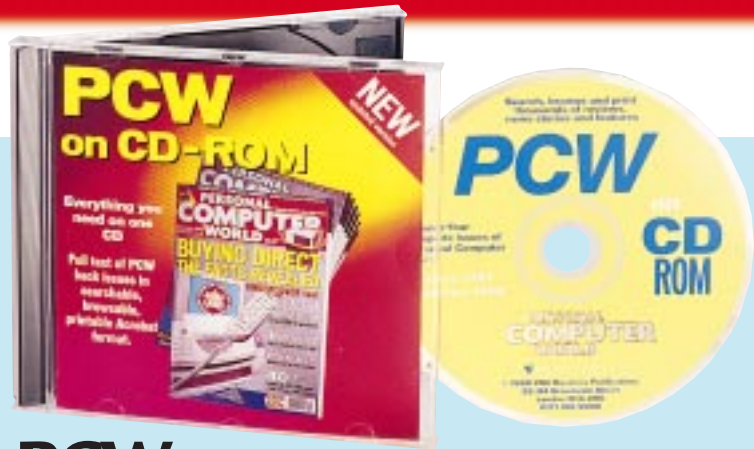
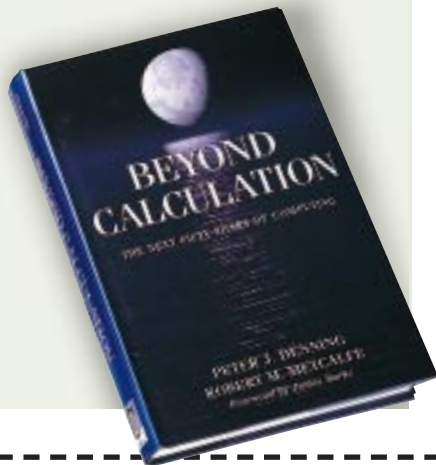
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# leisure lines

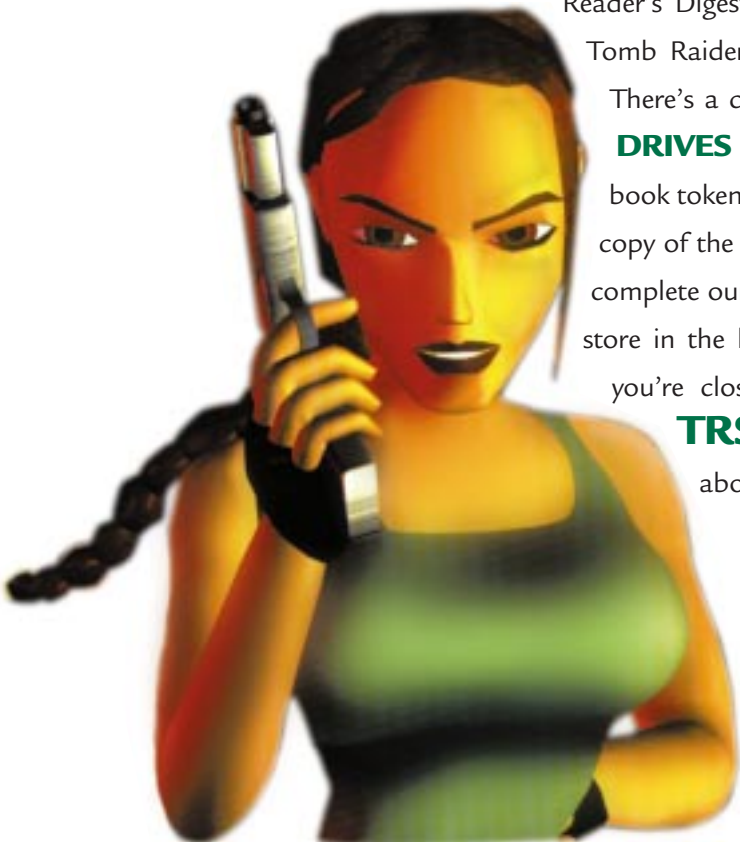
There are plenty of rugged boys' games in *Screenplay* this month: **PREMIER LEAGUE FOOTBALL MANAGER 99**, the Speed Busters racing game, and Squad Commander, based on the movie, Small Soldiers. There's **PINBALL ARCADE** and the strategy war game, 101: Airborne Invasion of Normandy, plus a fun, face-filching game called **HEDZ**. Tradition is the theme of our *Kids* section. We present the **GREAT GAMES COMPENDIUM**, full of the favourite games children used to play in the days before PCs. And, Noddy stars in the second of his children's activity games, **LET'S GET READY FOR SCHOOL**. *Parlez-vous français?*



[ABOVE RIGHT] ▲  
SPEED BUSTERS  
AND SQUAD  
COMMANDER  
◀ [LEFT] LET'S  
GET READY FOR  
SCHOOL

If you're considering learning a new language, in this month's *CD-ROM* section we review three titles which aim to bring out the French in you. When you're ready for a bit of relaxation, you can take a tour of Virtual Visits To The Cities Of Europe. And Paul Trueman positively purrs as, in his review of **CATZ 3**, he tells us about life with his three virtual pets. In our *Books* section are New Rules For The New Economy and the Reader's Digest Beginner's Guide To Home Computing, and Tomb Raider fans will want to read **LARA'S BOOK**. There's a chance to win one of ten **PIONEER DVD DRIVES** in our *Competition*, you could win yourself a £20 book token by solving our **BRAINTEASERS** puzzle, or a copy of the new Chambers dictionary could be yours if you complete our *Prize Crossword*. Meanwhile, if you pass a Tandy store in the high street, stop for a moment to reflect that you're close to a piece of computing history: Tandy's **TRS-80 MODEL I** was a PC pioneer. Read all about it in this month's reflective *Retro* section.

ETELKA CLARK, LEISURE LINES EDITOR  
[ETELKAC@VNU.CO.UK](mailto:ETELKAC@VNU.CO.UK)



# Hedz: Head Extreme Destruction Zone

This game gives new meaning to 'You're doing my head in, man'.

A big purple alien with green eyes and long, horrific teeth grins malevolently down from the billboard for Hedz, the face of a punk rocker hanging limp from its gloved fingertips. It's enough to put you off your food. But don't let this stop you from trying it out: despite the nightmare-inducing advert, this game is a cracker.

Hedz is simple yet devilishly twisted. You are part of a savage alien race which has taken to wearing the heads of its human victims, not just because they feel nice, but also because they

► IF YOU WANT TO GET A HEAD, GET A WEAPON. STAB 'EM, HOSE 'EM, WHATEVER — IT'S YOUR CHOICE

convey unique powers upon the wearer. Unfortunately, everyone has got a little too enthusiastic about building up their cranial collection, so it has been decreed that a nearby asteroid belt will become a free-for-all arena where everyone can



duke it out, thereby wreaking minimal havoc on the luckless human population.

The number of characters and level of detail in Hedz is impressive. My favourites were the Little Old Lady with her deadly teeth, the Highland Hammer Thrower and the Elvis Impersonator. Finding the keys and gathering enough cash can be a real challenge, although not overwhelmingly so. Hedz also has one of the grooviest soundtracks I've heard in a while. The only quibble is that users with lesser graphics cards might have a few problems, but this gives you all the more reason to upgrade. Hedz is fast, furious and seriously fun.

SUSAN PEDERSON

## PCW DETAILS

★★★★★

Price £39.99 (inc VAT)

Contact Hasbro Interactive  
01429 855038 [www.hedz.com](http://www.hedz.com)

System Specification Windows 95 or higher, Pentium 100 or higher, 16Mb RAM, 2Mb graphics card, 4X CD-ROM, 30Mb free hard-disk space.

# Pinball Arcade

Pinball wizards will flip out over the choice of seven tables.

Microsoft's latest release is a budget affair; another piece of software that continues the Seattle giant's love affair with Americana. And as you can see from the screenshots, the designers have done a great job with the look of this game.

The tables look wonderfully realistic and Microsoft has obviously done its maths. The reflections off the ball as it spins around the table are utterly believable, and on some of the tables

there are up to three balls flipping their way around simultaneously. Granted, this is not necessarily any great graphical feat these days; but Pinball Arcade is the first game to look 100 percent real — at least in 2D.



▲ WHAT A CLASSIC — 'SLICK CHICK' IS SPELT OUT ON THE BUMPERS!

◀ THE SPIRIT OF '76 IS A TRULY GREAT TABLE

There are seven tables from which to choose, each reflecting the evolution of pinball since the Baffle Ball table in 1931. My personal favourite is the Spirit of '76 table, and the last table is the Cue Ball Wizard from 1992.

It's typical of Microsoft to approach the game so seriously, as though it were presenting itself as a pinball-museum curator. In some ways this strategy backfires, as pinball only really took off in the fifties. Games were rather dull before then, but here you get a chance to play Baffle Ball, a 60-year-old game that is interesting, but only for about three minutes.

This is a lovely game to look at, however, and probably as good as pinball is ever going to get on the PC. Just make sure, before you buy, that you really do love the flippers'n'tilt.

PAUL TRUEMAN

## PCW DETAILS

★★★★★

Price £19.99

Contact Microsoft 0345 002000  
[www.microsoft.com](http://www.microsoft.com)

System Specification Windows 95/98/NT4.0, Pentium 90MHz processor, 16Mb RAM, 15Mb free hard-disk space, double-speed CD-ROM drive.

# Small Soldiers: Squad Commander

Battery-powered **toy soldiers** slug it out.

**Small Soldiers** is structured around the simplest of real-time strategy games and is aimed at 8- to 14-year-olds. You command one of two squads: the Gorgonites, a rabble of monstrous mutants, or the Commandos, your standard "rednecks". Your opponents are the squad you didn't choose. Through a succession of missions you complete campaigns to either save or conquer, depending on your choice of squad, the vital strategic areas of a quiet, unsuspecting town. The squad consists of battery-powered toys and the battlefield could be anything from a bedroom to the back porch.

**The graphics are large**, well animated and good-humoured. Any fear of child corruption is eliminated when you observe that a dying toy merely falls to pieces when its battery runs out and can easily be replaced from the toybox.



▲ YOU CAN CHOOSE A TEAM OF SIX UGLY GORGONITES...  
▶ ...AND PIT THEM AGAINST THE REDNECK COMMANDOS



Control is easy, using basic mouse functions. But the lack of intelligence in your soldiers is frustrating: without specific instructions, they tend to wander into danger or just stand there while their comrades are cut to pieces. You might think this game would present a challenge for the younger end of its target age group, but I bet your kids will surprise you.

IAN ROBSON

## PCW DETAILS



**Price** £29.99

**Contact** Hasbro Interactive 0990 745745

[www.hasbro-interactive.com](http://www.hasbro-interactive.com)

**System Specification** (minimum)

Pentium 100 or equivalent, 16Mb RAM, 4Mb video card (3Dfx card recommended), 4X CD-ROM, 25Mb free hard-disk space.

# Premier League Football Manager 99

Is your team a winner, or is it **early doors** all round?

**There was a rash** of World Cup cash-in attempts last summer by football personalities such as Ron Atkinson (commentating legend he may be, great manager he is not), none of which were

really any good. So, along comes the "official" Electronic Arts version to clear up. Or does it? Because this is official, you get all the real players and teams, rather than the knock-off "Manchester United" or "Liverpool" teams from which you choose in unlicensed games. So, posing as the Greatest Living Englishman, John Gregory,



◀ FANTASY FOOTBALL: TEDDY GETS A FIRST-TEAM GAME FOR UNITED

we took charge of the claret and blue glory of Aston Villa at the start of the 1998-99 season. And promptly lost. Every match. For a whole season.

**A lot of work** appears to have gone into the design of this game, so it's all the more frustrating when you cannot figure out how to win a match. It all looks great, and, unlike real football management, you can control every aspect of your club, from the buying of players to the leasing of the ground and stadium. Alternatively, you can switch off all that day-to-day stuff and concentrate on winning a game.

It will take you forever to learn how to play, and it will drive you bonkers watching your team lose week in, week out. But Premier League Manager is monumentally playable.

PAUL TRUEMAN

## PCW DETAILS



**Price** £39.99

**Contact** Electronic Arts 01753 549442

[www.easports.com](http://www.easports.com)

**System Specification** Windows 95/98, Pentium 133MHz processor, 16Mb RAM, 2X CD-ROM drive, 2Mb video card, 110Mb free hard-disk space.

# Speed Busters

Fast fun and some **silly surprises** for fans of US gas-guzzlers.



▲ **TIGER IN YOUR TANK... TREE IN THE ROAD... AAARGH!**  
 ◀ **IN YOUR LITTLE DEUCE COUPE, YOU COULD 'WHUP A THUNDERBIRD LIKE SHE'S STANDING STILL'**

**Speed Busters is not** just another Sega Rally-alike. In the spirit of individuality, it falls into the "slightly silly" category. For instance, on the Hollywood track there is a giant gorilla and an escaped Tyrannosaurus Rex!

Speed Busters is published by Ubisoft, maker of POD, the first driving game to make use of MMX enhancements. You

can drive one of several fifties-style souped-up US gas-guzzlers, with the option of customising them with existing paint-jobs or painting the car yourself. Plus, there are the usual engine enhancement and tune-up options to buy if you do well enough. It's good fun, and the physics programmers have done well to give the cars the feel of big, heavy

brutes with rolling suspension. With the appropriate 3D hardware (Voodoo or Direct3D-compatible), the graphics look fabulous.

**The tracks are more akin** to levels in Quake II, with weird surprises and shortcuts to find, including the ability to jump on to the back of a moving train. There's a hidden car and track to find, too. But with the emphasis on silliness, you'll find this game doesn't have the engrossing longevity of something like Colin McRae Rally. Overall though, Speed Busters is an expertly programmed, good-looking slice of four-wheeled fun that's well worth the price.

DAVID FEARON

## PCW DETAILS



**Price** £29.99

**Contact** Ubisoft 0181 944 9000

[www.ubisoft.com](http://www.ubisoft.com)

**System Specification** Pentium 166, 32Mb RAM. Direct3D or 3Dfx accelerator recommended.

# 101: The Airborne Invasion of Normandy

**War games with an emphasis on reality that's a bit too heavy.**



◀ **HAS MIGUEL MADE IT? HOW'S HIS MORALE?...**  
 ▼ **...WHAT WILL IT BE LIKE WHEN HE'S FACE-TO-FACE WITH A BATTLE TANK?**



**If you like a bit of fun** in your strategy games, stop reading right now. Empire's latest war game requires you to live and breath strategy. Fun doesn't figure. This is the only strategy battle game I've played where most of your units are out of action before missions even start: jumping out of aeroplanes at night behind enemy lines is a dangerous

business, and 101 models it accurately — and I mean *accurately* — with a couple of minutes of full-motion video showing what happens to each soldier as he parachutes in. If the planes do manage to get that far, they tend to get shot down, with most of your men still aboard. Of course, all this happens only after you have spent an hour or so

studying the mission brief, picking your team and mulling over what weapons and supplies to give them, right down to whether or not a change of clothes would be advisable. Each soldier in the game has an individual personality and a unique voice, as well as a load of personal statistics, such as morale and initiative, which change during combat.

**101 is a seriously hard-core** strategy game. Such strategy games are usually turn-based and this is no exception. No frenzied action here, just "action points" and statistics. You get the gist: if you're into this kind of thing, you know who you are. If you're not, 101: Airborne Invasion of Normandy will bore you witless. It's so obsessed with modelling the realities of war that I actually found it somewhat offensive.

DAVID FEARON

## PCW DETAILS



**Price** £39.99

**Contact** Empire 0181 343 9143

[www.empire.co.uk](http://www.empire.co.uk)

**System Specification** Windows 95/NT4, Pentium 90, 200Mb free hard-disk space, 16Mb RAM (32Mb for NT), 2Mb SVGA graphics card.

# Virtual Visits to the Cities Of Europe

Look before you book: it's the **continental highlights** in a nutshell.

**The concept behind** this CD-ROM is pretty impressive. It was just a shame I didn't get the chance to use it to its full potential, as it ran slowly and crashed more times than I care to remember.

The theory is that you take virtual tours to cities in Europe and get a taste for the sights, before having to pay hard cash to go there in person. For example, you can experience the canal bikes of Amsterdam and the gondolas of Venice, or visit famous churches, museums and parks. You can take a trip on the London Underground or visit Red Square in Moscow, all with full-circle panoramic viewing. As well as the virtual tours, there is a section



◀ **PLANNING A TRIP TO AMSTERDAM? DON'T FORGET TO PACK YOUR CLOGS**

full of practical information, ideal for anyone actually planning to travel. For each city there is useful advice on flights, booking accommodation, metric conversions and restaurant recommendations, and you can brush up on languages with simple phrases included in the interactive phrase book.

**There are 450 sights** to visit and information on over 700 subjects, so this is a fairly jam-packed CD-ROM; maybe all my hardware problems were caused by the PC version of jet lag. It's not the best Virtual Reality software to hit the market, but it beats having to endure bad flights, weather and food in order to enjoy a nice bit of sightseeing.

ETELKA CLARK

## PCW DETAILS

★★★

**Price** £39.00

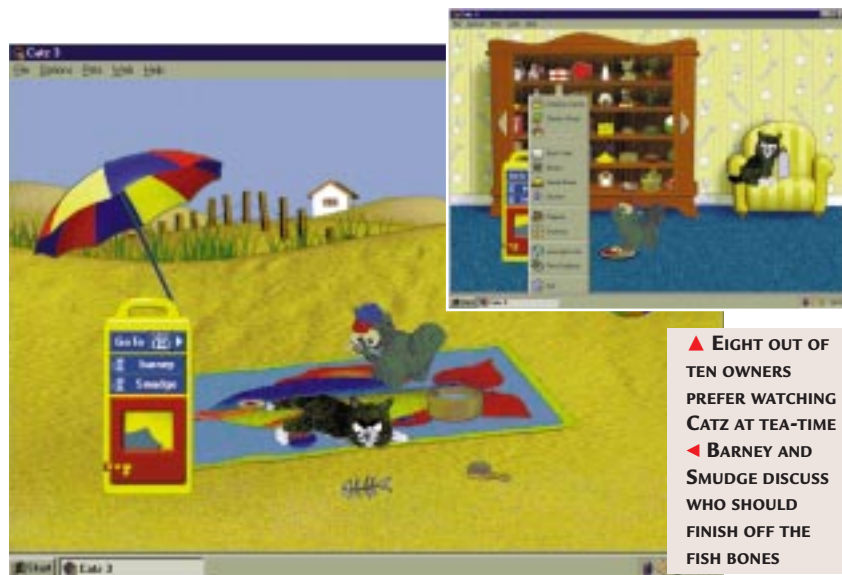
**Contact** Netgate Publishing  
(available from the internet only)

[www.netgate.co.uk](http://www.netgate.co.uk)

**System Specification** Windows 95/98, NT, 486 processor, 8Mb RAM.

# Catz 3

Meet Jester, Barney and Smudge, the **friendly PC felines**.



**The team behind** the Virtual Petz have sold a phenomenal two million copies of Catz (and Dogz, in fact), the software that lets animal-lovers bring their pets to work with them, having chosen them from the Adoption Centre. You can take your cats down to the beach or the

garden, and there is a packed toy cupboard for them to explore.

This isn't a game, you understand: there are ten breeds to choose from and you can adopt as many as you like, giving them names and dozens of toys to play with. Bear in mind that you can only play

with two cats at a time, so don't adopt too many — it wouldn't be fair to devote all your attention to one particular furry favourite.

**The cynical side** of you might say that the little tykes are only as "real" as the talking paperclip in Office97; but it's no good. This reviewer and his girlfriend became hopelessly attached to their three kittens, and gave up their lives for weeks on end to concentrate on trying to mate Jester (F) and Barney (M). Yes, a new feature of Catz 3 is that your cats procreate! You've got to hope they like each other, of course: our third cat, Smudge (M), was a bit of a non-starter as Jester didn't find his nasty temper remotely attractive. We've had no luck with Jester and Barney so far, but we're still trying...

PAUL TRUEMAN

## PCW DETAILS

★★★★★

**Price** £14.99

**Contact** Mindscape 01444 246333

[www.mindscape.com](http://www.mindscape.com)

**System Specification** Windows 95/98, Pentium 90MHz processor, 32Mb RAM, 85Mb hard-disk space.



# The French collection

Parlez-vous français? You will, after you've spent time with these **teach-yourself French** CDs.



If the **only French phrase** you know is “voulez-vous coucher avec moi, ce soir?”, then maybe it's time to learn more. There is a world of language software titles on the market, from which we've picked three to compare.

## Language Labs

This is a surprisingly basic learning tool that at the very least is disappointing. It's also quite difficult to get it to work, as the cursor fails to react to mouse-clicks and the screen is strangely minimised. The teaching methods are not particularly stimulating, being repetitive and simple, but the use of techniques from the Rosetta Stone courses is a redeeming factor.

This particular series is based on the principle of learning in the way we do our own native tongue: that is, using the association of objects, and written and spoken words, in specific sequences and contexts. In this sense, Language Labs would be a good option for beginners of any age, but some patience is required with the CD itself.

## Tell Me More

Auralog's contribution proved to be a vast improvement. An interactive program based on voice recognition, Tell Me More represents a thorough and comprehensive approach, combining conversation practise with grammar, written exercises and vocabulary. It works on a listen-then-speak basis and offers a good variety of exercises designed to test all aspects of your learning abilities. Navigation is exceptionally easy, as the shortcuts are

permanently sited at the bottom of the screen. Accessing the different sections via the main menu gives you further choices by displaying each available theme for every section — dialogue or pronunciation, for example — so you can go back to those you had trouble with.

A unique feature of this program is the set of video clips that correspond to each lesson. They test your listening and understanding by asking you, in French, a number of questions relating to the sequence you've just seen. Other activities include crosswords, hangman and word association, all of which serve as revision and vocabulary exercises. You can view your lesson report at any time, enabling you to gauge your progress and see where your strengths and weaknesses lie.

Overall this is a well produced and smoothly presented program, and it is very enjoyable to use. The fact that you can set the acceptance level to make it easier or harder means it will carry you through a good distance of learning.

## Speak Fluent French

GSP's program is an impressive piece of work, suitable for all study levels. The only problem is, it's almost exactly the same as Tell Me More; that, too, is produced by Auralog, so this probably explains the striking similarities. The pronunciation exercise is more sophisticated on Speak Fluent French, though. Here, the same listen-and-repeat mode is used, although

the actual sound waves of both the native speaker's voice and your voice are comparatively displayed. This is particularly useful, as it lets you see where your pronunciation needs attention.

It appears that in order for Auralog to get away with making two very similar products and sell them as separate programs, each CD has something the other lacks. Tell Me More includes video sequences, while Speak Fluent French has the special pronunciation feature which registers and analyses your voice. I preferred the presentation and ease of use of Tell Me More, and found the video sequences potentially more instructive. However, the £25 difference in price may ultimately sway me.

HELEN FORTGANG

## PCW DETAILS



### Language Labs

Price £19.99

Contact Europress 01625 855000

[www.europress.co.uk](http://www.europress.co.uk)

**System Specification** MPC or equivalent, Windows 3.1 or 95/98, 486 DX, 4Mb of hard-disk space, 4Mb RAM, CD-ROM, SuperVGA monitor and video card (640x480 resolution, 256 colours), SoundBlaster-compatible sound card.



### Tell Me More

Price £44.99

Contact Auralog 0171 926 6266

[www.aurolog.com](http://www.aurolog.com)

**System Specification** IBM PC or compatible, 486 DX4 100MHz, Windows 95/98, 8Mb RAM (30Mb available on hard drive), 16-bit Windows-compatible audio card, SVGA video card (640x480 resolution, 256 colours), speakers or headphones; 2X CD-ROM drive, microphone (not included).



### Speak Fluent French

Price £19.95

Contact GSP 01480 496600

[www.gspltd.co.uk](http://www.gspltd.co.uk)

**System Specification** IBM-compatible PC, 486 processor or above, Windows 3.1 and above, or Windows 95/98; 8Mb RAM, 20Mb to install, 10Mb when installed; 16-bit Windows-compatible audio card, speaker or headphones; 2X CD-ROM drive, microphone (not included).

# Noddy – Let's Get Ready For School

Children can have **fun with learning** as they join Noddy and his Toyland friends.

Although there has emerged a certain amount of controversy surrounding Noddy and his friends, the little chap always seems to come back fighting. Alongside a new TV series, the BBC has compiled this children's CD-ROM based around Key Stage One of the National Curriculum.



◀ **NODDY AND TUBBY BEAR SHARE THE JUICY TOYLAND GOSSIP OVER A NICE POT OF TEA**

Let's Get Ready For School is aimed at children between three and six years. The player assumes the role of Noddy and has to earn pocket money by completing the ten activities in the game. These include helping to fix Mr Spark's ice-cream van, trying to put Toyland back together after a storm, helping Master

Tubby Bear with his homework, and learning to dance. After each activity Big Ears gives Noddy a

sixpence as a reward for his hard work.

When Noddy has enough money, he can go to the fair. These activities are very different from

the usual children's learning software, but they are undoubtedly valuable. Key educational areas

include spelling, following patterns, colour recognition, simple arithmetic and a basic musical understanding. Parents can set a difficulty level to suit their child, and check their progress along the way.

This CD-ROM is beautifully presented and includes all of Noddy's Toyland friends with the original voices, characters and sets. And for anyone with any concerns, be assured that Noddy sleeps alone in his bed.

ETELKA CLARK

## PCW DETAILS

★★★★

Price £24.99

Contact BBC Multimedia Section  
0181 576 3592

[www.bbc.co.uk](http://www.bbc.co.uk)

System Specification Windows 95/98,  
P100 processor, 16Mb RAM, sound card.

# The Great Games Compendium

Bored with shoot-em-ups? Then perhaps **board games** are more your style.



▲ **YOU CAN CHOOSE FROM FIVE FAMILY FAVOURITES**  
▶ **PIG DOMINOES ADDS A DECIDEDLY PORCINE SLANT TO THE CLASSIC GAME**



Rather than try to reinvent the wheel, Tivola has gone back to the classics. The company has produced The Great Games Compendium as a throwback to the time before personal computing, when "game-playing" meant purchasing a large box full of all types of board games, and everyone would be entertained without recourse to a box in the corner of the room. Tivola claims

that The Great Games Compendium is suitable for anyone aged 4-102, and they're right. Beautifully animated and designed, it features five games from before anyone had ever heard of a PC, and gives them a nineties spin. So, rather than flying spaceships and blasting aliens halfway across the universe, the whole family can load up this CD-ROM and enjoy a game together, safe in the

knowledge that the content is entirely suitable for children.

There is a version of BattleShips played against the god of the sea, Neptune; Tic Tac Toe played in an apartment block; as well as Pig Dominoes! All very quaint and old fashioned, maybe, but the main reason these games are all still around is precisely because of their undeniable playability. They all look fantastic, they're perfect for all the family to play, and this is a great way for children to get familiar with both their PC and the games people used to play.

PAUL TRUEMAN

## PCW DETAILS

★★★★

Price £12.99

Contact Tivola 0181 741 8011  
[www.tivola.com](http://www.tivola.com)

System Specification Windows  
3.1/95/98/NT4.0, 486 processor,  
8Mb RAM, 2X CD-ROM.

# Win a Pioneer DVD-ROM drive!



**P**ioneer Multimedia is launching the world's fastest DVD-ROM drive. To celebrate, the company is giving away 10 of them to lucky PCW readers.

➔ The new drive, the **DVD-AO3S** (ATAPI), will be bundled in retail outlets throughout Europe with a cutting-edge package that includes interactive DVD formats of Westwood Studios' **Blade Runner** game and Electronic Publishing Association's **LANGMaster Collins COBUILD Student's** dictionary.

With market-leading transfer rates of 6X for DVD-ROM (8.3Mb/sec) and 32X for CD-ROM (4.8Mb/sec), the new drive operates 30 percent more efficiently than its predecessor and supports multiple disc formats including DVD-R. It comes with improved seek and access times of 100ms and 110ms for DVD-ROM, and 75ms and 80ms for CD-ROM.

The DVD-AO3S is equipped with



Pioneer Multimedia's slot-in disc loading mechanism for safer disc handling and added flexibility.

The drive can read both single- and dual-layer DVD discs. In comparison with a CD-ROM disc, a single-sided, single-layer DVD disc offers seven times the capacity, and a double-sided, dual-layer DVD disc, 26 times the capacity.

Both Blade Runner and LANGMaster Collins COBUILD Student's Dictionary incorporate visual and audio DVD quality, and are indicative of the capacity and flexibility of the new technology.

➔ For a chance to win one of these great prizes, just answer the following question:

- What game comes bundled with the Pioneer DVD-AO3S drive?

## HOW TO ENTER THE COMPETITION

1. Via our web site at [www.pcw.co.uk](http://www.pcw.co.uk), or
2. Write your answer, name, address and daytime telephone number on a postcard or on the back of a sealed envelope. Mark your card "PCW/Pioneer Competition" and send it to: P.O. Box 191, Woking, Surrey GU21 1FT, by Friday 5th February 1999.

*Please state clearly on your competition entry if you do not wish to receive promotional material from other companies.*

## RULES OF ENTRY

**T**his competition is open to readers of *Personal Computer World*, except for employees (and their families) of VNU Business Publications and Pioneer Multimedia. The Editor of *Personal Computer World* is the sole judge of the competition and his decision is final. No cash alternative is available in lieu of competition prizes.



# High and mighty

Tandy's TRS-80 Model I was a **hit in the high street**. Simon Collin salutes a micro pioneer.

If you happen to stroll past a Tandy store on your high street, slow down, because you're walking past one of the pioneers of home computers. It's rather unusual for a shop — OK, a vast international chain of shops — to develop a computer, but Tandy (Radio Shack in the US) led the field with its TRS-80 range of computers developed in late 1976. By the summer of 1977 it had announced its first computer, the TRS-80 Model I, available in the US for \$600.

The TRS-80 was a humble home computer. Like the Commodore Vic 20, it was designed in the "fat keyboard" style which squeezed all the electronics under the keyboard. As a result, the computer was neat and compact but could be a pain when it came to rewiring the internals, which was necessary for reliable operation. The keyboard, incidentally, followed the Star Trek trend of the time with black keys on a black background and a solitary white Return key. The case was painted silver.

**For your \$600** the basic Model I was driven by a Zilog Z80 processor at 1.774MHz and sported just 4Kb of RAM. Radio Shack kindly provided one of the world's worst versions of BASIC in ROM, which limited developers to 26 variables (called A-Z) and one array (A). In common with other home micros of the period, software was stored on cassette tape and text displayed on a rebadged TV.

To get the most out of your TRS-80 required a large silver box, grandly called the Expansion Interface. This plugged into the back of the keyboard via a notoriously unreliable cable and allowed you to "spoil" your TRS-80 with an extra 16Kb of RAM, serial ports, and either two cassette decks or up to four floppy-disk drives. Once the disk drive had been fitted and was up and running, you could even try out a new operating system called MS-DOS, from the West Coast startup Microsoft, or you could be dull and stick to either CP/M or the native TRS-DOS.

**Unusually, and possibly a first for a micro, the TRS-80 Model 1 spawned clones**



▲ TANDY HIT GOLD WITH THE SNAZZY SILVER AND BLACK TRS-80 MODEL I

**The TRS-80 hit the market** running and became an immediate success. It was launched in the days when "compact computer" meant a Digital PDP-11 which was the size of a small filing cabinet. As a result, it provided a great way for millions of users to get their hands dirty learning how to extend and enhance the computer.

One of the reasons for the Model I's success was the strength of the third-party software market. There were

dozens of replacement BASIC interpreters, Pascal and Cobol compilers,

and masses of rather good games.

Unusually, and possibly a first for a micro, the TRS-80 Model I spawned clones. Everyone assumes that the IBM PC was the first to engender copycat products, but the PC was launched four years after the TRS-80. In the early eighties there were several manufacturers producing Model I compatibles with more memory and better graphics. But Radio Shack designers stayed busy and, two years later, the TRS-80 Model II was announced. Unlike the Model I, this new computer was aimed at a different

market, the business

user. The Model II

was seen as dull but worthy and only survived six months. The following summer three new computers were launched, with a new TRS-80 Model III heading the line-up. It was a neat-looking computer and took its design cue from the mainframe terminals of the time. The big plastic casing had swooping sides and curves that enclosed keyboard, monitor and drives. Unusually, the designers kept the back of the case smooth by moving all the expansion connectors to a position beneath the case. It was odd, and a trifle inconvenient, but it all worked perfectly.

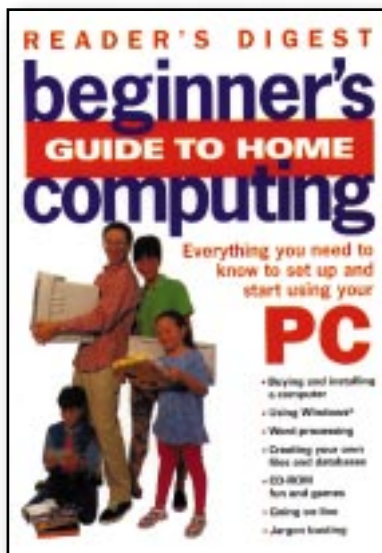
**All this time** though, the Model I was still selling as an entry-level home computer. But the summer launches brought a new home computer to replace the venerable beast. The TRS-80 Color Computer had new graphics and a new, incompatible processor. Unfortunately, the Model I did not stand up to internal competition. It even failed to meet new regulations, so Radio Shack ceased production of this trailblazer. Unlike many other early manufacturers, Tandy still survives and continues to sell PCs on the high street.

# books

## Reader's Digest Beginner's Guide to Home Computing

**B**uying a first computer can be a daunting task, especially if you know nothing about PCs. What will you need? Why will you need it? Where will you get it? Of course, these are questions PCW answers every month; but really, if you're a novice, it does help to have things spelt out in jargon-free language. The *Reader's Digest Beginner's Guide to Home Computing* sets out to provide a quick reference that doesn't go into depth, but instead gives the basics to enable informed decisions.

This guide is primarily aimed at family users, incorporating ideas for home business, housekeeping, kids' "edutainment", the internet and multimedia. Around these main subjects the book weaves its instruction, bringing ideas together to demonstrate how



you can benefit from the different functions and possibilities that a PC and all the various peripherals provide. You can learn how to do your own desktop publishing, create your own files

and databases, and get acquainted with the rest of the world by email.

Opening with clear advice about what to consider when buying, the guidance remains user-friendly throughout the book, accompanied by clear colour-screen references and the happy faces of the models who are no longer baffled by the uncompromising world of personal computing. There is also a glossary giving brief, jargon-busting explanations.

**The Guide may not be** the Rosetta Stone of deciphering your computer manual, but it will dispel those clouds of confusion previously hovering over your PC. Because of the limited depth of the information, it offers no troubleshooting tips and will not serve as a long-lasting reference. However, it does provide a good basis with which to improve your familiarity with PCs and will help to increase your computing confidence.

HELEN FORTGANG

### PCW DETAILS



#### BEGINNER'S GUIDE TO HOME COMPUTING

**Publisher** Reader's Digest Association

**ISBN** 0-276-42397-6

**Price** £18.99

## Lara's Book — Lara Croft and the Tomb Raider Phenomenon

**D**ouglas Coupland is probably one of the finest writers of his generation. He followed up his masterpiece, *Microserfs*, with the lyrical, elegiac *Girlfriend in a Coma*. What no-one could have predicted was that his next prose effort would be an ode to the digitally babelicious, all-conquering adventuress Lara Croft.

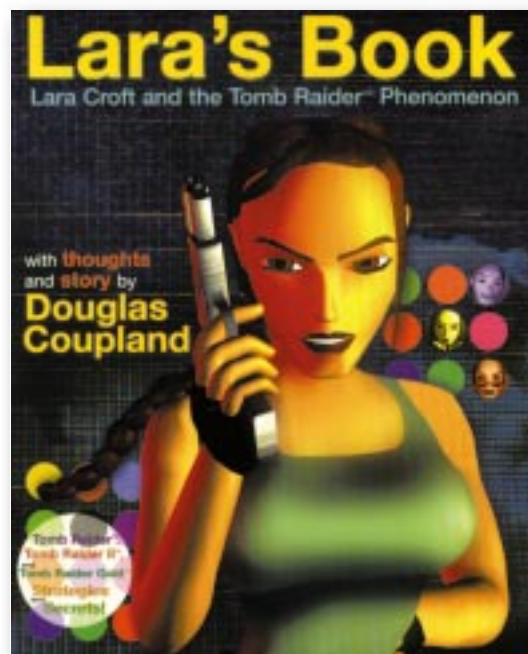
In a previous book, *Polaroids from the Dead*, Coupland discussed his idea of becoming "hyper-real" through technology; a phenomenon peculiar to the late 20th century. No character better illustrates his idea of being virtual while

becoming ubiquitous better than the curvy heroine of the Tomb Raider series. In *Lara's Book*, Coupland writes a short introductory piece from Lara's perspective and,

as usual, he is insightful and humorous. After the mournful *Girlfriend*, it's a relief to see him writing something as skittish as this.

As well as an arty look inside Lara's head, there's a hilariously camp comic-book story, also written by Coupland, to finish the book off. In other chapters, hundreds of glossy, easy-on-the-eye pictures of the lovely Lara are a visual treat, there's a light piece about the making of the games, and some insight into Lara's huge internet following. There are also walk-throughs to Tomb Raider and TRII, as well as the various add-on packs. Frankly though, there are better ones available for free on the internet.

**It's all very light** and frothy, but is nonetheless thoroughly enjoyable. As to whether it's worth nearly £16, I'm not so sure. Probably the best gauge of its



worth will come from the hordes of 15-year-old boys who will surely buy it just for the pictures of Lara in various states of undress. In the end, Coupland may find that his digital wisdom falls on deaf ears.

PAUL TRUEMAN

### PCW DETAILS



#### LARA'S BOOK

**Authors** Douglas Coupland and Kip Ward

**Publisher** Prima

**ISBN** 0-7615-1580-1

**Price** £15.99

# New Rules for the New Economy: 10 ways the network economy is changing everything

Unless you've been living on a desert island for the past few years, you could hardly have failed to notice that there is a technological revolution in progress. The birth of e-commerce, the explosion of individual networks and the world wide web are all leading to a network economy that will transform how we run our businesses and our lives. But if you don't know which way the tide is turning, how can you possibly hope to keep your feet dry?

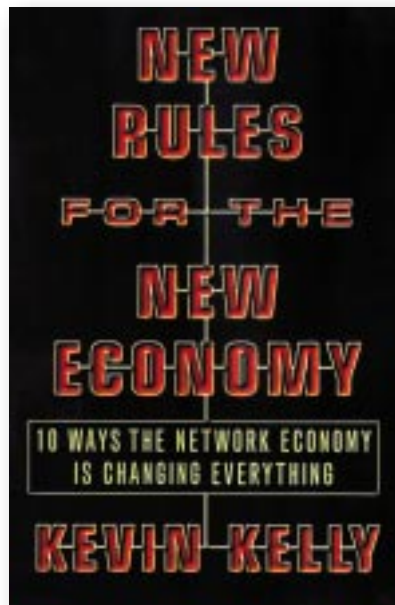
**Kevin Kelly, executive editor** of *Wired* magazine, has written a book that sets out to give us a few answers. At first glance, *New Rules for the New Economy* seems to be a rather disappointing follow-up to *Out of Control*, his entertaining treatise on the new bionic frontier. But after a slow start Kelly gets into the groove, using entertaining anecdotes to illustrate his ten theories about network development, behaviour and applications.

To start off, Kelly states that the forthcoming economic revolution will not be about computers. In fact, he

*If you're after hard and fast answers, you might come away disappointed*

claims that "computers are over". Rather, it will be about communication, about computers and networks talking to each other. He asserts that this communication will transform all other sectors as well, including "manual" industries such as farming, trucking and manufacturing.

The web will drive an unstoppable demand for free products, flexible partnerships and a global economy. The question is, how will this come



about? Well, Kelly believes that it will not actually be dependent on the number of chips in computers, but in all manufactured objects: a can of soup, a book, or a shirt. These cheap, throwaway "jelly bean" chips will give us the power to connect everything to anything. He also talks about the power of the "swarm", a large number of connected objects which, acting together, can achieve what could not have been achieved individually. He writes: "A standalone object, no matter how well designed, has limited potential for new weirdness. A connected object has unlimited possibilities."

**At the end of each chapter**, Kelly outlines a number of different strategies for maximising the business opportunities provided by a network economy. These are not so much specific pieces of advice, as much as ideas about how to think differently about the underlying frameworks and principles of your business. If you are looking for hard and fast answers, you might come away disappointed, but *New Rules for the New Economy* is nevertheless a thought-provoking primer.

SUSAN PEDERSON

## PCW DETAILS



**NEW RULES FOR THE NEW ECONOMY**

**Author** Kevin Kelly

**Publisher** Fourth Estate

**ISBN** 1-85702-871-6

**Price** £15.99

TOP

10

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Prices include VAT on disks and CD-ROMs. List supplied by The PC Bookshop, 21 Sicilian Avenue, London WC1A 2QH. Telephone: 0171 831 0022 Fax: 0171 831 0443

# brainteasers

## Quickie

Can you solve the following division problem:

$$\text{DROP} \div \text{CARD} = \text{C}$$

Each letter represents a different non-zero digit and C is greater than 2.

## Prize Puzzle - February 1999

This month's puzzle is a variant on an old chestnut. And although you might recognise it, it's unlikely you will have a solution to hand. Here goes...

Seven pirates find an old treasure map and sail to the island where the treasure is purported to be. Sure enough, they discover a cave full of Spanish golden doubloons. They work all morning to bring all the coins from the cave into a single heap, and then decide to take an afternoon siesta before sharing the booty.

During the siesta period, one pirate awakes and decides to take his share and hide it before the others awake. So he divides the coins into seven equal amounts — there's an odd one left over which he throws into the sea — then hides his share and goes back to sleep.

Shortly after, another pirate awakes and also decides to take his share before the others awake. So, he divides the coins into seven equal amounts — again there's one left over which he



throws into the sea — then takes his share, hides it, and goes back to sleep.

The same process is repeated for each remaining pirate: every time, there is an odd coin left over after the division, which is discarded.

Finally, they all awake, and admit to each other what they've done. Not being very numerate, no-one seems to mind, and they decide to share the remaining coins equally between themselves. There's one left over, which gets thrown into the sea.

What is the least number of coins that there could have been originally?

Send your answers on a postcard or on the back of an empty sealed envelope, to:

PCW Prize Puzzle - February 1999  
Harrogate, N. Yorks HG2 0XJ  
to arrive not later than 20th February 1999. Or you can email your solution only (no explanatory notes or program listings, etc.) to [jj.clessa@btinternet.com](mailto:jj.clessa@btinternet.com)

Please do not send solutions on floppy disks or in envelopes.

Good luck!

The Prize Crossword will reappear in the next issue of PCW, on sale 28th January 1999. The solutions to last month's crossword are in this month's ChipChat.

## NOVEMBER 1998 PRIZE PUZZLE

We apologise unreservedly for the mess we seem to have made of our November problem. On learning from the Editor that the problem contained an error, we made a quick fix in time to catch the (then) imminent issue of PCW, only to realise a day or so later that the "fix" hadn't gone far enough.

Although quite a few entrants guessed the solution we were seeking, we have decided that the fairest way of dealing with this is to re-present the entire problem in this edition of the magazine, along with the February Prize Puzzle [above]. Last date for entries for both puzzles is 20th February 1999. Anyone who has already sent in a correct solution, need not re-submit.

We shall still call it the **November '98 Prize Puzzle** and it should be stated as follows:

Four men, Alf, Bob, Colin and Dave, are married to Kath, Liz, Mary and Nell — though not necessarily respectively.

Each of the eight people buy postage stamps, each buying as many stamps as the denomination of the stamp in pence, and no two people of the same sex buying the same denomination.

Each husband spent exactly P more than his wife, P being less than £1. Colin spent 9p more per stamp than Nell, and Dave spent 23p more per stamp than Bob's wife. Mary spent more than everyone else except her husband, and Liz spent the least.

Who is married to who?

Let's hope we've got it right this time! Anyway, one good thing has come out of this. We have decided to accept *Brainteasers* entries via email, although, for obvious reasons, only



basic solutions may be sent — i.e. just as you would send on postcards. No supporting analysis or email attachments, thank you, since we don't want the computer clogged up with long-winded explanations. The email address to use is [jj.clessa@btinternet.com](mailto:jj.clessa@btinternet.com) and we expect shortly to open a web site with the same name where we plan to give answers to Quickies. With a direct connection between *Brainteasers* and you, we'll be able to get any future cock-ups and queries sorted out much more efficiently.

JJ CLESSA

▶ DON'T FORGET THE ELECTRONIC VERSION OF THIS ORDER FORM. SEE THIS MONTH'S CD-ROM.

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**METHOD OF PAYMENT**

PERSONAL CHEQUE     PURCHASE ORDER     CREDIT CARD

C.O.D     DEBIT CARD     OTHER (SPECIFY) .....

CARD COMPANY ..... START DATE ..... / ..... / .....

ISSUE NUMBER (debit cards only) ..... EXPIRY DATE ..... / ..... / .....

CARD NUMBER (below)

**SUB-TOTAL** .....

**DISCOUNT** .....

**CARRIAGE** .....

**SURCHARGES** .....

**VAT** .....

**TOTAL** .....

**DELIVERY DETAILS**

**DELIVERED TO (ADDRESS)**

(IF DIFFERENT FROM ABOVE) .....

.....

.....

..... POSTCODE .....

**BUYER'S CHECK LIST**

AGREED DELIVERY DATE ..... / ..... / .....

TERMS OF WARRANTY     MONEY BACK     RETURNS POLICY

COST OF EXTENDED WARRANTY     HELPLINE

Details: .....

SIGNED ..... DATE ..... / ..... / ..... DAYTIME TELEPHONE NUMBER .....



## Contents

- 614 PCs & portables**  
Entry-level to high-end PCs, notebooks and PDAs.
- 615 Printers & scanners**  
Inkjet, lasers, photo printers and multifunction devices.
- 616 Peripherals**  
From digital cameras to modems, monitors to storage, graphics and sound cards.
- 617 Software**  
The greats of software. Classic products like Serif PagePlus 5, Access 97 and MYOB.
- 620 Faxback**  
Instant access to all PCW reviews and features through your fax machine.

### CREDIT CARD PROTECTION

If ordering goods over £100, we recommend you use your credit card. A credit card not only provides similar protection as that guaranteed under the "Buyers Charter" but, more importantly, it offers the additional advantage of reimbursement to your account of all monies paid for goods not received – usually within 28 days – when a company ceases to trade.

## All the best buys are here

**S**ometimes you just want to know the names of the best products, when they were reviewed, how much they cost and where you can get them. That's where our no-nonsense buyer's guide comes in. Over the following five pages we've picked out the outstanding PCs, peripherals and software packages that we can recommend without hesitation. To make it even easier, we've included the current manufacturer's contact number and price (including VAT), as well as details of when and where we reviewed the product. For the full review, why not check out PCW on CD-ROM? Updated quarterly, PCW on CD-ROM contains the full editorial from the past 24 issues, in searchable Adobe Acrobat format – it even comes with a copy of Acrobat for viewing, searching and printing. Each CD costs just £9.95 including postage and packing, or £8.96 for subscribers.

**Call 01795 414870** to order your copy or turn to **PCW Reader Offers** on page 308 for further details. If you can't wait for the next quarterly CD, try out our new **Faxback service** (p620) which provides 24-hour access to your favourite features and reviews.

GORDON LAING  
Editor

## Personal Computer World Buyer's Charter

### If things go wrong Mail order protection scheme

Anthony George, our Customer Services Manager, is here to help you if things go wrong or if you have a complaint about advertisements that have appeared in *Personal Computer World*. Write to him with details of the complaint and he will contact you.

Anthony George  
Customer Relations Department  
VNU Business Publications  
VNU House, 32 - 34 Broadwick Street  
London W1A 2HG

### Buyers Charter



When you order goods as a private individual reader from a UK supplier's advertisement in *Personal Computer World* and pay by post in advance of delivery to that Mail Order Advertiser who subsequently ceases to trade and

goes into Liquidation or Bankruptcy prior to delivery of such goods, you may, under the "Buyers Charter", qualify for compensation, providing:

1. You have not received the goods or had your money returned.
2. You have followed the "Personal Computer World" guidelines when placing your order.
3. Have taken all reasonable steps to effect delivery or refund.
4. You have retained proof of purchase, for verification purposes:
  - a) A copy of the original advertisement from which the goods were ordered.
  - b) A copy of Personal Computer World's "Details of Transaction Form" (on opposite page).
  - c) Comprehensive proof of payment.

5. Submit claims so as to arrive "NOT EARLIER THAN TWENTY EIGHT DAYS AND NOT LATER THAN THREE MONTHS" from the official sale date of the magazine. Claims must be submitted to the Customer Services Manager IN WRITING, summarising the situation and lodged strictly within the time schedule stated. Claims received outside this period will not qualify for consideration for compensation under the "Buyers Charter".

After a supplier who has advertised has become subject to either liquidation or bankruptcy proceedings, Personal Computer World guarantees to process as expeditiously as possible those private individual readers' claims made and submitted, in accordance with those procedures outlined, up to the following limits.

- a) £2,000 in respect of any claim submitted by one Private Individual Reader.
- b) £100,000 in respect of all advertisers so affected in any one year.

These sums define the Publishers maximum liability under the scheme, and any additional payments above and beyond these thresholds will be entirely at the discretion of the Publishers.

As soon as legal confirmation that a state of liquidation or bankruptcy exists, the processing of claims will immediately commence. If, however, assets are available and the receiver/liquidator appointed confirms that an eventual payment will be made by way of a dividend, all claims under the "Buyers Charter" will be subject to re-processing and will take into account any shortfall which may then exist. Payments under the scheme will take into consideration the obligations and liabilities of other interested parties such as credit card and/or insurance organisations etc.

This guarantee only applies to advance postal payments

made by private individuals in direct response for goods itemised/illustrated in display advertisements. It does not cover goods ordered from advertising inserts or cards, classified advertisements or MicroMart, or catalogues obtained from, or supplied by, any advertiser.

The "Buyer's Charter" is designed to safeguard the PRIVATE individual reader. It does not provide protection to any companies, societies, organisations, unincorporated bodies or any other commercially orientated outlet of any description. Similarly, cover is not provided for orders placed from or to any overseas companies or for goods purchased for resale.

### CAVEAT EMPTOR

The protection of the "Buyers Charter" only applies to display advertisements carried in this publication. It is not designed for, nor will it protect the consumer, in circumstances whereby goods have been subsequently ordered and paid for as a direct result of any advertisements appearing on the Internet.

While limited protection still exists when Internet purchases are made from companies based in the UK, no such protection exists – other than that afforded by certain major credit card companies – relative to goods ordered from overseas organisations' web sites. We would strongly urge all readers to consider the following before purchasing via the Internet: Advertised prices invariably exclude transportation charges, do not account for currency fluctuations, Customs & Excise duties, VAT, documentation and/or importation restrictions. Statutory rights are virtually non-existent, guarantees – if any – impossible to enforce, replacement of faulty goods and/or refunds difficult to obtain, no official regulatory organisation to call upon for assistance when things go wrong, and no protection under the "Buyers Charter".

## ENTRY-LEVEL PC

### Lexon Entra 333

This PC is so packed with good components it's hard to believe that it's available for just £499 ex VAT. Based around a Celeron 333 running on a BX motherboard for easy upgrading later on, it comes with an impressive 64Mb of DRAM. It has some excellent components, too: Matrox Millennium G200 graphics card with 8Mb RAM, Creative Labs 64 PCI sound card and a 56K modem.

► PCW February '99, p171



**Price** £586.33 **Contact** Lexon 0181 532 6100 **Also Recommended** Panrix Micro333 **Price** £587.50 **Contact** Panrix 01132 444958 • Protek UltraMX **Price** £586.33 **Contact** Protek 01884 822300 (both PCW February '99)

## HIGH-END NOTEBOOK

### IBM ThinkPad 600

Made for the road warrior, this thin, light, notebook excels in its build quality. Based around a variety of processors, ranging from a Pentium 233MMX right up to a Mobile PII 300, it also has a huge 4Gb hard drive, 32 or 64Mb of RAM and a 13.3in TFT screen and AGP graphics. In short, it has everything you need from a desktop machine in a very portable package.

► PCW July '98, p79



**Price** £4,266.43 **Contact** IBM 0870 601 0136 **Also Recommended** Gateway Solo 9100 **Price** £3,876.33 **Contact** Gateway 0800 282000 (PCW June '98)

## MID-RANGE PC

### Tiny Family Bonus

With an easily upgradeable BX motherboard, the Tiny Family Bonus should keep you happy for a while. And it comes with no less than three useful peripherals: the Umax 610P scanner, the Epson Stylus Color 300 printer and the Fuji DX-5 digital camera.

► PCW January '99, p148



**Price** £1,056 **Contact** Tiny 0800 821333 **Also Recommended** Dan Xplora II Plus **Price** £1,018 **Contact** Dan 0181 830 1100 • Mertec XM300-K2 **Price** £999 **Contact** Mertec 01792 473700 (both PCW January '99)

## MID-RANGE NOTEBOOK

### Sony PCG-505G

Not only has the PCG-505G fabulous good looks, but it is also the ultimate in desirable equipment. It is not only incredibly small, thin and light for a fully fledged Windows 98 notebook, it also has everything you need to make working a pleasure. There is a floppy and docking station which connect to boost the functionality, and it even has 1394 built in as standard.

► PCW December '98, p79



**Price** £2,300 **Contact** Sony 0870 240 2408 **Also Recommended** Gateway Solo 2500 S6-300SE **Price** £2,173 **Contact** Gateway 0800 172000 (PCW October '98)

## HIGH-END PC

### Carrera Power Pro 2-450

In addition to being a speed monster, the quality of this machine's internal components far outstrips others. The SoundBlaster Live! audio card is a perfect gamer's card with its four-speaker, surround-sound output. Similarly, the fast 450MHz Pentium II processor is a good companion to the powerful Diamond Viper V550 graphics card.

► PCW January '99, p141

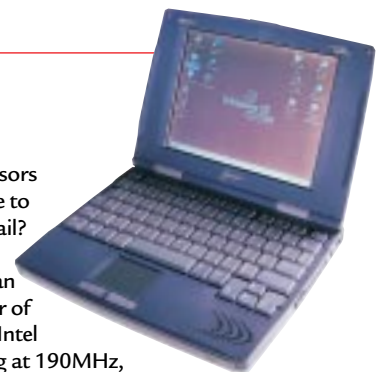


**Price** £1,550 **Contact** Carrera 0171 830 0486 **Also Recommended** Armari NBX-350 95 **Price** £1,498 **Contact** Armari 0181 810 7441 • Gateway G6-350 **Price** £1,397 **Contact** Gateway 0800 552000 (both PCW Jan '99)

## PDA

### Hewlett-Packard Jornada 820e

Fed up with ever-faster processors when all you need is a machine to take notes and check your email? The Jornada could be the answer to your prayers. You can work for a full day without fear of the battery dying and with an Intel StrongARM processor running at 190MHz, 16Mb RAM and an integrated 56K modem, it has everything you need when on the move. And its 8.2in STN screen with a resolution of 640x480 is large enough to see exactly what you are doing.



**Price** £849 **Contact** HP 0990 474747 **Also Recommended** Psion Series 5 **Price** £429.9 **Contact** Psion 0990 143050 • 3Com PalmPilot Pro **Price** £229 **Contact** 3Com 0800 225252 (both PCW May '98)

## COLOUR INKJET

### Hewlett-Packard DeskJet 895CXi

For all-round excellence you cannot do better than the HP 895CXi. The quality of its output for both text and graphics is impressive given the swift speed at which they are produced. Even its "econofast" mode could be used for vital documents, saving both time and ink. It takes a huge range of papers and replacing ink cartridges is a breeze.

PCW February '99, p151



**Price** £292.58 **Contact** HP 0990 474747 **Also Recommended** Epson Stylus Color 740 **Price** £272.60 **Contact** 0800 220546 • Epson Stylus Color 850 **Price** £318.43 **Contact** 0800 220546 (both PCW February '99)

## COLOUR PHOTO PRINTER

### Epson Stylus Photo 700

Colour inkjets have split into two categories, with this type clearly designed to reproduce the most realistic colour photographic prints. Epson has for a long time been the undisputed leader and its Stylus Photo 700 is our choice for inkjet photo printing. However, Lexmark comes very close behind with its 5700.

PCW September '98, p188



**Price** £273 **Contact** Epson 01442 261144 **Also Recommended** Lexmark 5700 **Price** £229 **Contact** Lexmark 01628 481500 (PCW September '98)

## BUDGET LASER PRINTER

### Kyocera FS-600

This personal 6ppm laser printer easily beats all other laser printers in its class. Its speed is impressive, printing out a steady six pages per minute no matter what the paper coverage, and the quality of its output is second to none, both for graphics and text. It is easily upgradeable, taking an impressive 36Mb of RAM. It has a PostScript option and there is even an ethernet port that comes as standard.

PCW February '99, p199



**Price** £299 **Contact** Kyocera 0118 923 0660 **Also Recommended** Panasonic KX-P6300 **Price** £257.32 **Contact** Panasonic 01344 853081 (PCW February '99)

## BUSINESS LASER PRINTER

### Lexmark Optra K1220

It is rare that you find a printer which is both good value and produces exceptional quality output, yet the Optra K1220 is just such a laser printer. With a rated speed of 12ppm it produces text in good time, but most of all its outstanding quality, both for text and graphics, puts it second to none amongst laser printers.

PCW February '99, p201



**Price** £722.63 **Contact** Lexmark 01628 481500 **Also Recommended** QMS DeskLaser 1600P **Price** £816 **Contact** QMS 01784 445555 • HP LaserJet 4000TN **Price** £1,316 **Contact** HP 0990 474747 (both PCW February '99)

## MULTIFUNCTION DEVICE

### Hewlett-Packard LaserJet 3100

Good laser-print quality from this quiet machine. It's intelligent enough to detect a document dropped into its feeder and it will launch an idiot-proof menu for scanning, copying and emailing. Fast, accurate OCR and 2Mb memory for incoming faxes when the paper supply is exhausted, makes the 3100 an ideal multifunction device.

PCW June '98, p83



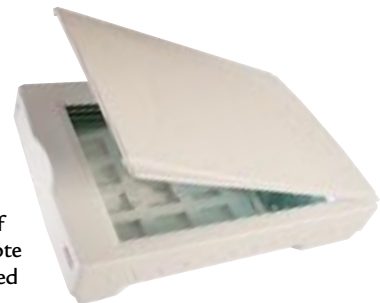
**Price** £629 **Contact** HP 0990 474747 **Also Recommended** Canon MultiPASS MPC20 **Price** £370.13 **Contact** Canon 0181 773 3173 (PCW January '98)

## FLATBED SCANNER

### Umax Astra 610P

Once again, the Umax Astra 610P parallel-port scanner has won our budget flatbed scanner group test, boasting an unbeatable combination of performance and value. Note that our three recommended scanners require enhanced parallel ports found only on modern PCs, so users wanting top performance, or those with older systems, should stick to SCSI.

PCW September '98, p229



**Price** £69.33 **Contact** Umax 01344 871329 **Also Recommended** Agfa SnapScan 310P **Price** £116.50 **Contact** Agfa 0181 231 4200 • Microtek Phantom 330CX **Price** £75.95 **Contact** Microtek 01908 317797 (PCW Sept '98)



## DIGITAL CAMERA

### Kodak DC260

Once again Kodak has produced the best digital camera for under £1,000. Not only does it have a high resolution, producing excellent images at 1,536x1,024 pixels, but it also has a 3X zoom. Add its advanced features, including scripting facilities and you have a highly desirable and indispensable camera.

► PCW October '98, p226



**Price** £899 **Contact** Kodak 0800 281487 **Also Recommended** Epson PhotoPC 700 **Price** £587.50 **Contact** Epson 0800 289622 • Ricoh RDC-4300 **Price** £599 **Contact** Ricoh 01782 753355 (both PCW October '98)

## MONITOR

### Nokia Multigraph 447Za

No matter what you do, it's vital to get a good monitor with a clean, flicker-free display. In April 1998's group test we looked at 17in models and found Nokia's Multigraph 447Za to be the best in our entry-level category. Those with more to spend should check out the Mitsubishi (see the details panel, below) which was our Editor's Choice in the high-end section.

► PCW April '98, p204



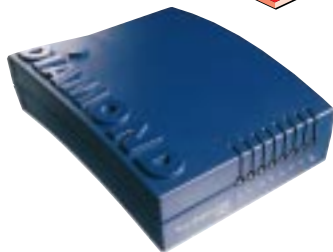
**Price** £440.63 **Contact** Nokia 01793 512809 **Also Recommended** Mitsubishi DiamondPro 700 **Price** £569.88 **Contact** Mitsubishi 01707 276100 (PCW April '98)

## MODEM

### Diamond SupraExpress 56e Pro

With ever-shifting goalposts, it makes sense to go for a modem which supports all the current standards, as well as simultaneous voice and data. Combine this with a roaring speed, superb ease of use and a low price, and you have the best-value modem around.

► PCW December '98, p211



**Price** £75 **Contact** Diamond Multimedia 0118 944 4401 **Also Recommended** Zoom FaxModem 56Kx **Price** £89 **Contact** SCS Data Communications 01494 748904 (PCW December '98)

## REMOVABLE STORAGE

### Iomega Jaz 2Gb

With such different capacities, interfaces and prices there is no one removable storage device to satisfy all needs. With the large capacity of 2Gb, the Jaz drive from Iomega should act as both an overflow for your hard disk and a back-up device to store all your vital data. If you are looking for something smaller, try either the Iomega Zip, with a capacity of 100Mb or the 120Mb LS-120.

► PCW August '98, p118



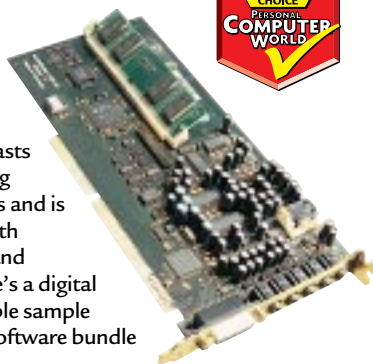
**Price** £270 **Contact** Iomega 0800 973194 **Also Recommended** Iomega Zip **Price** £70 **Contact** Iomega 0800 973194 • Imation SuperDisk 120 **Price** £105 **Contact** Imation 01344 402200 (both PCW August '98)

## SOUND CARD

### Terratec EWS64 S

A cut-down version of the heavyweight EWS64XL, Terratec's S model still boasts much of the same sampling and processing capabilities and is also a great games card with accelerated DirectSound and positional 3D audio. There's a digital I/O option and upgradeable sample memory, and the decent software bundle includes Cubasis AV.

► PCW July '98, p210



**Price** £149.23 **Contact** Terratec 01600 772111 **Also Recommended** Creative Labs AWE 64 Gold **Price** £129.25 **Contact** Creative Labs 01245 265265 (PCW July '98)

## GRAPHICS CARD

### Diamond Viper V550

Sporting Riva's latest TNT chipset, the Viper V550 graphics card provides absolutely storming 3D performance, with a full 3D feature set and good image quality to boot. Its 16Mb of RAM provides ultra-high 2D desktop resolutions in standard Windows applications.

► PCW November '98, p198



**Price** Approx £150 **Contact** Diamond Multimedia 0118 944 4400 **Also Recommended** MetaByte Wicked 3D **Price** £211.50 **Contact** Watford Electronics 01582 745555 (PCW November '98)

## ACCOUNTING

### Bestware MYOB



Ideal for the owner-manager and good for bookkeepers, too, Mind Your Own Business (MYOB) is our choice for accountancy software. We also recommend TAS Books which offers good bookkeeping and very powerful analysis.



► PCW June '98, p198

**Price** £229.13 **Contact** Bestware 01752 201901  
**Also Recommended** TAS Books **Price** £116.33 **Contact** Megatech  
01372 727274 (PCW June '98)

## PERSONAL FINANCE

### Microsoft Money Financial Suite 99



Microsoft Money Financial Suite 99 is our choice for personal finance. It offers online banking and updating facilities, as well as Sage compatibility, all at a bargain price.



► PCW  
February '99, p80

**Price** £49.99 **Contact** Microsoft 0345 002000  
**Also Recommended** Quicken 98 **Price** £39.99 **Contact** Intuit 0181 990 5500  
(PCW June '98)

## DATABASE

### Microsoft Access 97



This industry-standard database application is also the best. With its wizards, infamous Office Assistants and standard Windows interface, Access 97 is relatively easy for the novice. And its powerful relational features and VBA integration make it suitable for developers, too.



► PCW November '98, p220

**Price** £299 **Contact** Microsoft 0345 002000  
**Also Recommended** FileMaker Pro 4 **Price** £169  
**Contact** FileMaker 0845 603 9100 (PCW November '98)

## DTP

### Serif PagePlus 5



Inexpensive, easy-to-use and surprisingly well equipped, PagePlus 5 offers extremely capable desktop publishing. Those wanting the choice of professional publishers will have to fork out more for Quark XPress 4X.



► PCW June '98, p132

**Price** £99.95 **Contact** Serif 0800 376 7070  
**Also Recommended** Quark XPress 4 **Price** £1,169 **Contact** Quark  
01483 454397 (PCW June '98)

## IMAGE EDITING

### Ulead PhotoExpress 2.0



Ulead has succeeded in removing the frustration factor often involved in getting to grips with digital pictures. PhotoExpress 2.0 is a pleasure to use, with a great, clearly structured interface and fast, in-depth tools. It has pre-set editing modes for the novice and custom adjustments for each editing function, so the power user will be kept happy, too.



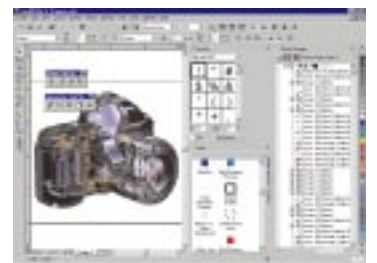
► PCW January '99, p202

**Price** £34.95 **Contact** BIT 01420 83811 **Also Recommended** Adobe  
PhotoDeluxe 3 **Price** £45.83 **Contact** Adobe 0181 606 4001 • Paint Shop Pro 5  
**Price** £69.95 **Contact** Digital Workshop 01295 258335 (both PCW January '99)

## DRAWING

### Corel CorelDraw 8

Not one of Corel's classic years, but this is still the Windows drawing package to own. Version 8 of this giant suite boasts better drawing and new interactive tools. Artists on a budget should check out Micrografx Windows Draw 6.



► PCW October '98, p203

**Price** £464.13 **Contact** Corel 0800 581028 **Also Recommended**  
Adobe Illustrator **Price** £351.32 **Contact** Adobe 0181 606 4000 • Freehand  
**Price** £327.82 **Contact** Macromedia 01344 458600 (both PCW October '98)

## INFORMATION MANAGERS

### Starfish Sidekick 98



The best personal information manager boasts wide customisability as its greatest strength. For heavyweight contact management, you need look no further than Goldmine 4 (see the details panel, below).



PCW August '98, p204

**Price** £39.99 **Contact** Starfish 0181 875 4455  
**Also Recommended** Goldmine 4 **Price** £229 **Contact** AVG 0171 335 2222  
 (PCW August '98)

## REMOTE ACCESS

### Traveling Software LapLink Tech

The high-end version of this extremely versatile product, LapLink Tech, has all the features of the standard version but also lets you print from the host machine onto a remote printer, or vice versa, and talk to whoever is using the host machine. It includes anti-virus and hard-disk cloning utilities.



PCW December '98, p233

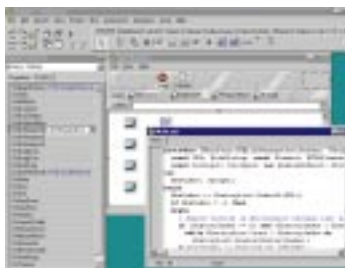
**Price** £169.95 **Contact** Traveling Software 01344 383232  
**Also Recommended** Symantec pcAnywhere **Price** £75.08 **Contact** Symantec  
 0171 616 5600 (PCW December '98)

## PROGRAMMING TOOL

### Symantec Visual Café 2



Visual Café 2 is the most productive visual Java tool out there and has the option of native-code compilation for Windows. Windows developers should go for Borland Delphi 3 which, although more complex, comes into its own on larger applications.



PCW April '98, p177

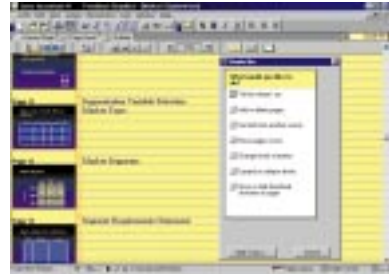
**Price** from £79 **Contact** Symantec 0171 616 5600  
**Also Recommended** Borland Delphi 3 **Price** £95.18 **Contact** Borland  
 01734 320022 (PCW April '98)

## PRESENTATION GRAPHICS

### Lotus Freelance 97



This is our choice for electronic presentations. For you it may also come down to which office suite you own or are considering, but as part of Microsoft Office 97, PowerPoint won't let you down.



PCW March '98, p200

**Price** £49.35 **Contact** Lotus 01784 445808  
**Also Recommended** MS PowerPoint 97 **Price** £325.47 **Contact** Microsoft  
 0345 002000 (PCW March '98)

## WEB DESIGN

### SoftQuad HotMetal Pro 4.0

This is an excellent all-rounder and HotMetal Pro 4 gets our thumbs up for web design. For a slick interface and Office 97 integration, Microsoft's FrontPage 98 is certainly worth a close look.



PCW January '98, p196

**Price** £123.38 **Contact** SoftQuad 0181 387 4110 **Also Recommended**  
 FrontPage 98 **Price** £116.30 **Contact** Microsoft 0345 002000  
 (PCW January '98)

## ANTI-VIRUS

### Norton AntiVirus 4.0



Norton AntiVirus 4.0 is our choice for protecting your PC. It offers the best combination of features, ease of use and performance. Its virus detection rate is first class and there are free online updates for the life of the product.



PCW April '98, p124

**Price** £49 **Contact** Symantec 0171 616 5600  
**Also Recommended** Dr Solomon's HomeGuard **Price** £29 **Contact**  
 Dr Solomon's 01296 318700 (PCW April '98)

# Faxback Service

## Missed a feature or a review? Try our 24-hour faxback service.

Updated every month, our easy-to-use Faxback service gives you instant access to a complete range of product reviews, features and workshops via your fax machine.

To use the service, simply follow the instructions below. Calls are charged at 50p per minute at all times, with an average duration of four minutes.

Our service is available 24 hours a day, 365 days a year. (The faxback service is not available outside the UK.)

- 1 From the choices below, select the article(s) you wish to receive. Note the number of pages in the article.
- 2 Using the handset on your fax machine, dial 0660 600632. If you do not have a handset, press the fax machine's On Hook or Telephone button, then enter 0660 600632 on the keypad.
- 3 There will be a vocal introduction to the Faxback service which will ask you to enter the code of the article(s) you require. The voice will then ask you to press the Start / Send button on your fax machine.
- 4 The article(s) you have requested will now come through your fax machine.

### IMPORTANT INFORMATION

For the faxback service to work correctly, you must be referring to the current issue of *Personal Computer World*, and have your machine set to use tone dialling (you may need to switch your machine from "pulse" to "tone"). If you

have any problems with the *Personal Computer World* faxback service, please call 0171 412 3795. This helpline is open from 9:00am to 5:30pm Monday to Friday, and calls are charged at the standard rate.

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450MHz PCs	November-98	11	2004
Undercover PC group test	December-98	20	2005
Xeon Server roundup	December-98	4	2006
HARDWARE GROUP TESTS	ISSUE	PAGES	CODE
Laser printers	February-98	10	2101
17in monitors	April-98	10	2102
PDA's and handhelds	May-98	14	2103
Sound cards	July-98	11	2104
Removable storage	August-98	5	2105
Colour inkjets	September-98	14	2106
Budget flatbed scanners	September-98	9	2107
Digital cameras	October-98	12	2108
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Communications hardware	December-98	11	2110
Digital video	January-99	13	2111
SOFTWARE GROUP TESTS	ISSUE	PAGES	CODE
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Presentation tools	March-98	9	2202

**PCW Faxback number: 0660 600632**

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Information / contact managers	August-98	10	2207
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Databases	November-98	10	2211
Communications	December-98	10	2212
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## Bleeping, blooping boxes on the big screen

**Y**ou know what really annoys me? Computers in movies. Yes, without exception, the film-making world has clearly no idea of what a computer is or how it works. Don't believe me? Let's take a closer look.

Going back 30 years or so, all computers looked like vertical fridge-freezers, complete with lengths of tape spinning mysteriously from reel to reel. So why did film-makers feel they had to overdub any IT footage with ridiculous "bloop-bloop" sounds? Check out *The Italian Job*, in which Benny Hill perplexes Turin's traffic computers which in 1969 were making the same strange sounds as used in *Forbidden Planet* as long ago as 1956. Sadly, whether comedy or serious thriller, these obscene noises were to stay with us for years to come.

Take *Wargames* in 1983. I'll happily suspend disbelief that a kid can hack into a chess-loving war simulator, but why did this huge box of electronics still have to make the same guttural electronic sounds of movie computers almost 30 years old? Still unconvinced? Just about every James Bond film features an electronic device, identifiable to the audience by its bright flashing lights and loud bleeping sounds. Espionage at the height of discretion...

Speaking of subtlety, why do all movie computers make a continuous "beep beep beep" sound for every character that appears on the screen? This is particularly evident in scenes where the system announces that access to confidential files has been denied — not surprising, considering the actor's



◀ **THE MALIGNANT MAINFRAME FROM SUPERMAN 3. AND YES, IT BLEEPED AWAY LIKE THE BEST OF 'EM**

random bangings on the keyboard. The most outrageous example is in *Star Trek 4*, when Scotty graphically describes how to construct transparent aluminium by blindly hammering away at the keyboard for five seconds. And you thought his accent was unforgivable.

Of course, it goes without saying that starting-up any computer is a long and tedious task, which is why most directors dispense with the process. But that's no excuse for James Cameron to have Arabian Windows 3.1 make the Mac sound when Arnie kicks a system into life in *True Lies*. And don't even get me started on the little girl who, after seeing that Jurassic Park is running on a couple of Mac Quadra 700s, announces that the amazing 3D interface she's

confronted with is a familiar Unix system... Although to be fair, it could be an obscure version of Linux.

Believe me, I'm not looking for perfection. It's just that computers have now become so mainstream that they should perhaps be given the benefit of a little more authenticity to make them believable, even in the context of the movies.

Alternatively, perhaps in an act of life imitating art, Microsoft should produce a set of desktop themes that simulate movie computers. That way, I can mindlessly bang away at my keyboard while my PC makes blooping noises as it inadvertently stumbles upon the government's hidden space-alien files. No, hang on, my access has been denied.

**IVOR BUGBEAR**

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#### ACROSS

7 Video 8 Cell 9 Port 11 Sector  
12 Explorer 13 Java 15 Bug 16 Crash  
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25 OCR 26 Gate 28 Netscape  
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